CAR OF THE YEAR page 70

BATTLE ZONE! RC tank attack

RADIO CONTROL car action

THE WORLD'S BEST-SELLING RC CAR MAGAZINE

WIN BIG! WINNERS' CIRCLE SWEEPS page 114

BRUTE POWER

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TESTED

Kyosho V-One S
Sport spec, pro performance

Corally C4.1
Exceptionally exotic Euro-ride

DuraTrax Maximum ST and MT Pro
Factory-dialed with tuned-pipe power

70 ENGINES

Which .12-size powerplant is right for your ride?

PLUS How to convert a pull-start to bump-start

AUGUST 2001
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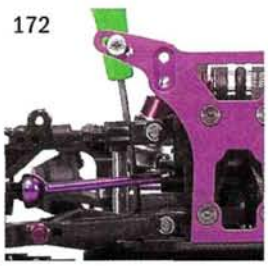
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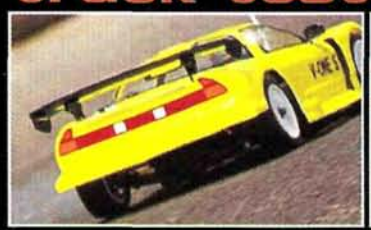

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Taking RC to the Maxx

Maxx, Maxx, Maxx ... as this month's cover will attest, we still haven't reached saturation point on the T-Maxx (or the E-Maxx, for that matter). We're still flooded with requests for Maxx articles, and it seems as if every "Readers' Rides" picture we receive is of yet another T- or E-Maxx.

The appeal of the Maxx trucks isn't hard to understand. First and foremost, they are monster trucks—easily the most recognizable and arguably the most intriguing vehicles to ever turn a wheel. Traxxas built on that instant appeal by delivering the capabilities of a full-size monster truck in RC. The Maxx trucks are the only RC monsters that effectively duplicate the cushy-soft, long-travel suspension of a true monster truck. With the options of nitro or electric power—both in ready-to-run trim right down to painted bodies—explaining the continued success of the Maxx series is a no-brainer.

But there's more to the Maxx story than Traxxas. I'm sure many Maxx owners will agree that the appeal of the Maxx goes deeper than what the truck *is* and is rooted more deeply in what it can *become*. Think about it: when was the last time you saw a stock Maxx? Though Traxxas got the trucks so undeniably right, it seems we just can't wait to strip off the arms and replace them with aluminum, peel off the tires for some Pro-Lines, swap the engine for a .21 (as Kevin did for this month's "4 x 4" installment), or add any of a hundred other aftermarket pieces. Do we really need this stuff? Nah. Do we really want it? Oh yeah. Unfettered by racer snobbery ("I won't use it if it doesn't make my truck perform better"), Maxx owners feel free to make their trucks as serious or as silly as their tastes and imaginations warrant.

We should all be so creative. Even if you don't have a Maxx, it's good to have a little Maxx spirit.

ALSO IN THIS ISSUE

Are you ready to upgrade your .12-powered nitro ride with a new engine? We have more than 70 in this month's 2001 Guide to .12 Engines. With all those choices, you're bound to find the perfect powerplant, and author Derek Buono didn't skimp on the sidebars; everything you need to know about nitro power is in there!

After playing with Kevin Hetmanski's Tamiya Tiger I behemoth and its infrared Battle System "weaponry," I'm hooked. The heck with BattleBots! Give me RC tank combat! In addition to the pure gee-whiz of its animated effects, the tank's electronic, dual-motor track system is a gearhead's dream come true. You'll see.

We also have two hot touring tests in this issue. On the nitro side, Kyosho's V-One S represents a new level of sophistication and competitive capability in an "entry-level" kit, with a full pivot-ball suspension, sealable differentials and pull-start .15 power. For the electric set, we have the Corally C4.1—the latest performance-first Corally tourer that actually manages to be an improvement on the original C4.

And did I mention Car of the Year? This is the issue in which we reveal our choice. Given the picks you made in the Readers' Choice voting published in the last issue, I think you'll agree we made a solid choice for Car of the Year. And which car is that? You'll have to turn to page 70 to find out!

See you next month.
Peter Vieira
Executive Editor

NEW ENGINE FEATURE!

Starting with this issue, *Radio Control Car Action* will feature reviews of the newest and most popular nitro powerplants. Along with real-world, in-car testing to determine an engine's "feel," every review will provide accurate dyno results that show true horsepower figures—thanks to *RC Nitro* magazine's purpose-built dynamometer.

RADIO CONTROL car action

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Full Nelson

I recently read that you want more people to get into this great hobby, so I did something about it! I am 15 years old, and recently I bought a Traxxas T-Maxx (great truck) and upgraded it with RPM A-arms, aluminum bumpers and titanium goodies. The first time I took it out on my street, four of my friends checked out the truck and loved it (and drove it, too!). Now they all have Stampedes and Rustlers, and one bought an E-Maxx that is faster than my .15. So now I'm saving up for an O.S. .21 RG-X (P) engine and a Robinson Racing World conversion kit so I can whup his butt with a .21 nitro-breathing monster! The good thing is that I got four new people into the hobby. Most of the time we race together at The Dirt (here in Hemet, CA) and on my backyard track (a lot of work). Keep up the great mag; you guys rock! [email]
NELSON ZAPATA

Audi Sports Strikes Back

Thank you for noting our speed record from summer 2000 on your website and in the May 2001 issue. I send my congratulations to Cliff Lett for achieving such incredible speeds. But to make things clear, I should point out that the car we used in our speed record run was fully within the EFRA rules for 1/10 electric touring cars. I mean the whole car—weight, height, width, batteries, motor, everything—would have passed the technical inspection of any international race. The car was inspected after the run by an official from our national motorsport federation.

Our car was an Xpress with a very low-friction drive train equipped with an LRP IPC7.1 speedo, an LRP Phaser receiver, an LRP Fusion motor (with a very special handwound armature) and LRP HiVolt RC2000 batteries. The record was run at a completely flat track-and-field stadium, so we did not have the advantage of banked turns. I think that one of the basic ideas is that this kind of record can be made everywhere with similar rules. It would be interesting to find out how fast Cliff could go with a "legal" TC3. [email]
LEO HONGISTO
Member of the Audi Sports Team Finland

That's news to me, Leo, and news to Team Associated; they thought your record was made without concern for any sanctioning body's rules. While it might be fun to see whether Team Associated could beat your record within similar constraints, I think most hobbyists are more interested in unlimited speed with no technological restraints. So let's turn the challenge around: instead of Associated pulling in the reins on its cars, I think Audi Sports should forget EFRA rules and go all out for speed. That Guinness World Records speed of 59.09mph still stands, but it needs to be broken. It may as well be broken by the guys who set it!
—Pete

Bounce Wit' Me

I was recently on vacation in Florida, and I saw many cars with hydraulics in the area where I stayed. I went to a hobby shop where they sold RC cars that you could put "hydraulics" on, and they would bounce. They used little motors rather than real hydraulics. It was really cool, and I was wondering whether RC cars could be modified in a similar way.
RYAN PHELPS
Pittsford, NY

Check out the October 1999 issue; Paul Conrad built a fully functional lowrider with a servo-actuated "hydraulic" system that makes the car rise, lower, bounce and do all the other things those crazy machines can do. If you want to hit the 3-wheel motion, Paul shows you the way to do it.
—Pete

Fair Shootout?

When I read the "2WD Race Truck Shootout" in the June 2001 issue, something bothered me. The Losi and Kyosho trucks were just the basic models; however, that you used the Factory Team T3 was a little weird. I think that you should have used the Team T3 or the Sport T3 to match the level of the other trucks. Also, I thought that it was amazing that you found the Triple-XT to be better than a fully hopped-up T3. It just goes to show how good Losi cars are.
CHRIS
goalie_dude@hotmail.com.

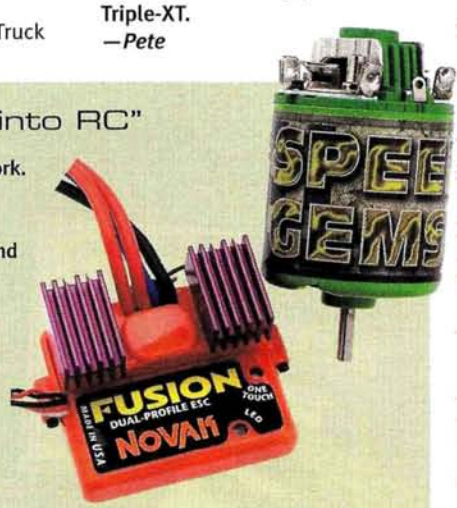
We wanted to test the best racing truck from each manufacturer, so we went for the Factory Team T3. If Associated's best truck is better equipped than its competition, it deserves credit for that. At any rate, I don't think the outcome would have been any different with the Team version, since most of the Factory Team's included option parts increase durability more than performance. And, yes; Losi cars are good, but not good enough to make up for a deficit in driving skill. A better driver wheeling an Ultima or T3 will still beat a less-skilled guy with the Triple-XT.
—Pete

YOU SAID IT "So far I've gotten more than 20 people into RC"

I am writing to tell you what a kick-butt mag you guys have. I first picked up an issue back in December of '99. I was so hooked that I had to subscribe. My first RC car was from RadioShack (although that doesn't really count). The car was later run over by a truck, and its electronics were damaged. I decided to buy a real RC car, and three years ago I purchased a Tamiya Stadium Blitzer. Guess what? My teacher caught me reading *RC Car Action* in class—and I got him hooked. Now he wants to throw a race at school. I am so excited, but there's one problem. I have no ESC and no motor. Hopefully, I'll find one before the race, but with no money, it will be hard. So far I've gotten more than 20 people into RC since I started to bring mags to school.

Wish me luck in the race, and keep up the good work.
DAVE
Hayward, CA
P.S. When I've upgraded the truck, I'll send a pic and hope it gets into "Readers' Rides."

See? See how easy it is to get an RC scene started? I'm printing Dave's letter for all you guys who complain that you have no one to race with, or no place to race. Do it yourself! Dave, I'm sending you a Novak Fusion ESC and a Trinity Speed Gems 2 Jade motor. Good luck in the race.—*Pete*



WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Air Age Inc., *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

EMAIL ■ Derek Buono: derekb@airage.com ■ Chris Chianelli: chrisc@airage.com ■ George M. Gonzalez: george@airage.com ■ Bob Hastings: bobh@airage.com ■ Kevin Hetmanski: kevinh@airage.com ■ Steve Pond: stevep@airage.com ■ Peter Vieira: peterv@airage.com ■ Greg Vogel: gregv@airage.com

BY CHRIS CHIANELLI

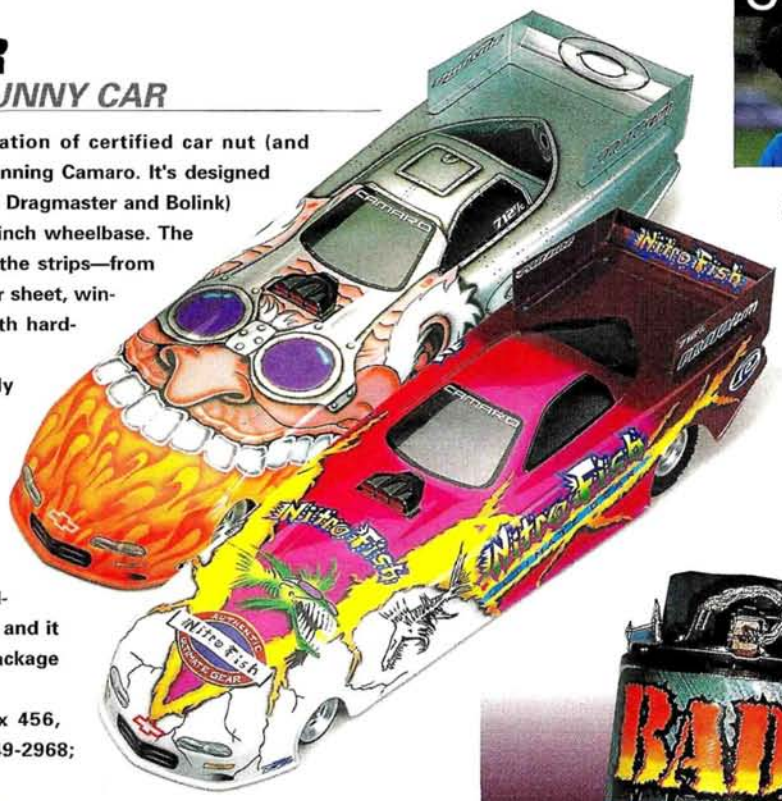
DRAGGIN' SLAYER

PROTOFORM 2001 CAMARO FUNNY CAR

The latest Lexan to come from the imagination of certified car nut (and Protoform head honcho) Dale Epp is this stunning Camaro. It's designed to fit all the popular funny car kits (Lockman, Dragmaster and Bolink) or any scratch-built chassis with a 13- to 14-inch wheelbase. The Camaro shows all the latest trends seen on the strips—from the carbon injectors to the huge rear spoiler. A sticker sheet, window masks and a separate spoiler/spill-plate kit with hardware are included.

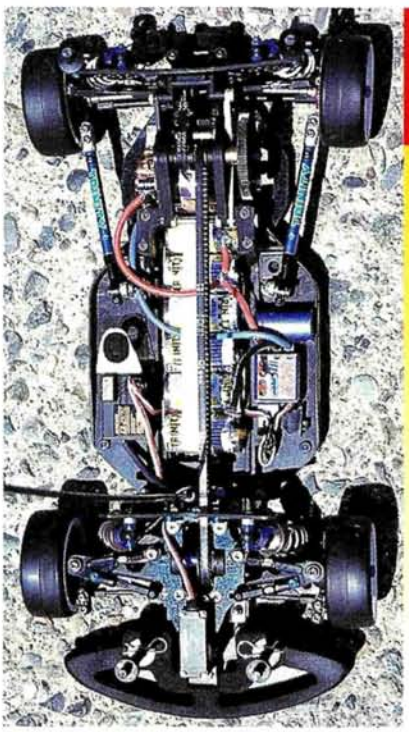
The funny cars tend to steal the show (especially with that paint—Oakley car by Brian Chudy, Nitro Fish by Brandon Gould), but the Camaro shells aren't all that's new this month from P'form. The Volvo S60 is the latest 190mm body, and it includes an add-on wing, wing-mounting hardware as well as window masks and detail stickers. For gas guys, the popular Chrysler 300M is now available in a fattie 200mm size to cover all nitro tourers, and it includes the same decal, mask, wing and hardware package as the Volvo.

Protoform; distributed by Pro-Line, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968; www.pro-lineracing.com.



TRINITY REFLEX

TOURING CAR DEBUTS AT REEDY RACE



Trinity is currently developing electric and nitro touring platforms to be dubbed the Reflex T and Reflex NT. Jim Dieter—Trinity's motor man, accomplished designer and skilled racer in his own right—is said to be the primary architect of the project (you may remember Trinity used the Reflex name for a Jim Dieter-designed dirt oval car back in the day). When we get more information on the cars' details, we'll be sure to share it. FYI, Trinity has confirmed that the nitro-powered Reflex will be the first to hit the shelves.

Trinity Products Inc., 36 Meridian Rd., Edison, NJ 08820; (732) 635-1600; fax (732) 635-1640; www.teamtrinity.com.

MAXX-READY REEDY BADDMAXX .07 MOTORS

MIKE REEDY HAS MORE IFMAR world-championship victories than he can count on his fingers and toes (unless he sprouts two extra toes), but the latest Reedy powerplants aren't for racing—at least, not IFMAR-style. Nope, Mike turned his attention to the red-hot Traxxas E-Maxx with his new .07-size BaddMaxx line, which includes Mild (19-turn) and Wild (15-turn) winds. Factory-installed bullet connectors and capacitors make installation a simple screwdriver job, and open endbells permit easy brush changes.

Reedy Modifieds/Team Associated, 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342; www.rc10.com.

TAKE A STAND!

- HARDCORE RACING T-MAXX TUNING STAND
- EXTREME ENGINEERING TUNE N' TOTE

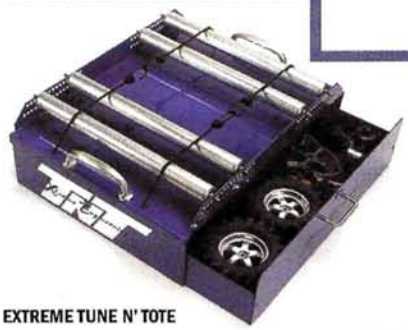
Ever tried to tune your nitro car or truck's engine while simultaneously holding it off the ground and operating the transmitter? That's one task too many for the average two-handed human bean, and that's why I'm into both of these setups. The Hardcore Racing T-Maxx stand clamps your T-Maxx into a sturdy aluminum frame so you can fire it up and hit the gas without wiping out your workbench. There are slots for your tools, and a padded handle makes it easy to carry your clipped-in T-Maxx to trackside.

The Extreme Engineering Tune N' Tote uses a set of ball-bearing rollers to keep your car or truck in place (the rollers are adjustable) while still allowing you to blip the throttle. A large drawer provides plenty of tool space, and a handle lets you carry it around (hence the "tote").

Hardcore Racing Components, 25435 Rye Canyon Rd., Valencia, CA 91355; (661) 294-5032; www.racinghardcore.com.

Extreme Engineering, 28874 State Hwy 34, Detroit Lakes, MN 56501; (218) 847-5813; fax (218) 847-8786; www.extremeengineering.com.

HARDCORE RACING STAND



EXTREME TUNE N' TOTE

PRO-LINE'S REAL DEAL

TIM CLARKE'S LATE MODEL STOCKER

Anyone who races RC dreams about getting behind the wheel of a full-size racecar—except Pro-Line's top-tire-design-dog Tim Clark. Tim doesn't need to dream it because he does it! That's Tim with his Super Late Model—the 3,200-pound, tube-chassis, 430hp, Chevy small-block-powered racing machine he pilots around Irwindale Motor Speedway's ½-mile course. According to Tim, the 100-lap main events average 93mph, with top speeds in excess of 120mph. On Tim's first night out, he finished 19 out of 45; in his second race, he moved all the way up to 11 out of 40; and in the third race ... well, Tim says his day ended early due to an "altercation" with another car (nice euphemism!). By the time you read this, Tim and his Pro-Line/Protoform/Jaco ride will be back in action—and probably winning, judging by the way Tim has been progressing.

RACE RUBBER FROM PANTHER TIRE

In addition to a full selection of tires for the Traxxas Maxx trucks, Panther now has race rubber for ⅒-scale trucks and buggies. Pictured from left to right are the Burner slick (my personal favorite), Stinger micro-pin, MicroRib front tire and Switch designs for all 2.2 truck rims. The Tiger micro-step-pin and Cheetah rear tires fit all 2.2 rear buggy rims, and the Lynx tires are Panther's ribbed buggy fronts. All of the tires are sold without foam inserts, so you can choose what works best for the conditions at hand.

Panther Products Inc., 4323 E. Michigan St., Indianapolis, IN 46201; (866) 700-TIRE; www.panthertire.com.

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RPM Bares its Clawz

RPM MONSTER CLAWZ RIMS FOR TRAXXAS MAXX

The Monster Clawz custom wheel design has been a popular item for RPM and all owners of trucks with 2.2 tires, but the Maxx guys were left out—until now. The Monster Clawz rims for Maxx trucks are available in three colors (chrome, purple chrome and blue chrome), and in two versions: standard offset, which duplicates the stock Maxx wheel configuration, and RPM's unique StableMaxx offset, which adds 1.2 inches to the width of your Maxx for superior stability. You also get the usual RPM wheel features: flawless plating, tough construction and prestripped tire-bonding areas.

RPM Inc., 14978 Sierra Bonita Ln., Chino, CA 91710; www.rpmrcproducts.com.

THIS ONE'S FOR MY FOAMIES ORION/JB FOAM TIRE INSERTS

Team Orion owner Philippe Neidhart tells us he has joined forces with JB Foam to offer what they feel are the best tire inserts available: "Mr. Bendiksen, designer of the famous JB Foams, will continue to develop and test touring-car inserts. His great experience in foam inserts' development and special manufacturing process have allowed JB Foams to be accepted worldwide as the best insert available for touring car racing tires." The new inserts will be available in the USA through Team Orion under the name "Team Orion/JB Foams."

Team Orion Inc., 22601 La Palma, Ste. 103, Yorba Linda, CA 92877; (714) 694-2812; fax (714) 694-2815; www.team-orion.com.

Snow Job!

Nitro Elements ArtAttack

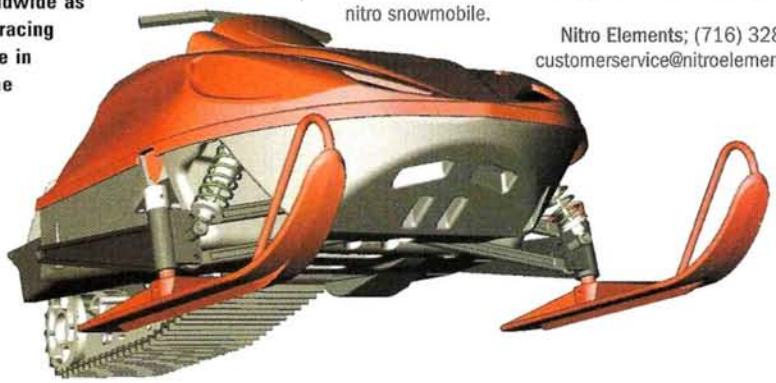
After talking with the guys at Nitro Elements, all we can say about their forthcoming ArtAttack RC snowmobile is "Wow!" The sled is designed and built entirely in the USA, and it's the real deal—all of the ArtAttack's components are purpose-built for snowmobile duty, and it's full of features. Check it out:

- Independent front suspension with oil-damped coil-over shocks.
- Suspended, floating track system with internal gear drive.
- Quarter scale—about 2 feet long and 1 foot wide.
- Injection-molded cowl with scoop-induction system; requires no trimming.
- Designed to accept electric power or a .21 engine (bump-start or pull-start).
- Includes extra-large custom flywheel engineered specifically for the ArtAttack.

According to Nitro Elements, the sled will be sold as an unassembled kit minus engine and electronics, and for year-round use, inline-skate-style wheels will be available as an option to replace the front skis. There are also plans for a rider figure.

We're trying to scam photos of the ArtAttack, but in the meantime, this computer drawing will have to do; we hope to have a picture in time for the next "Scoop." Contact Nitro Elements for more information—you can even pre-order one, if you need to be the first guy on the block to get an RC nitro snowmobile.

Nitro Elements; (716) 328-1356; customerservice@nitroelements.com.



GIANT CREATURE INVADES JAPAN

SHIZUOKA HOBBY SHOW SNEAK PEEK

DON'T WORRY—IT'S ONLY KEVIN HETMANSKI, our intrepid "4x4" columnist and Shizuoka Hobby Show attendee. The Hingeboy spotted the Tamiya TG10R (think 1/10-scale TGR) as well as this F1 Kyosho Mini-Z, just in time to make it into this issue; he'll have all the rest of the hot stuff from Japan in the next edition of "Inside Scoop." In the meantime, you can hit www.rccaraction.com for more Shizuoka Show updates.

Readers' Rides

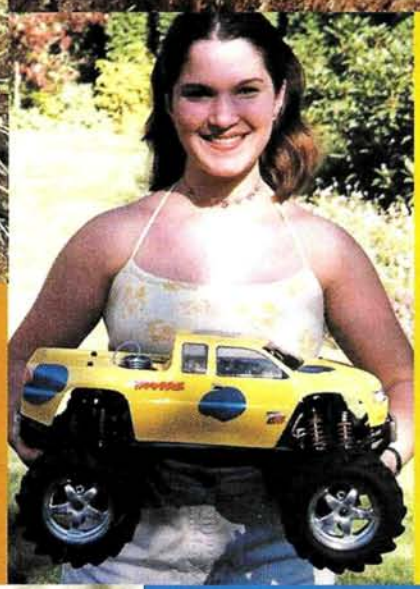
Win a one-year subscription to *Radio Control Car Action* magazine! Send a sharp, uncluttered, well-exposed color photo of your vehicle (no Polaroids) and a brief description to "Readers' Rides," *RC Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. If we publish your photo, you'll receive a free, one-year subscription to *RC Car Action* and will be eligible to win the "Reader's Ride of the Year Contest." Write your address and phone number on your letter and on the back of every photo you send. Good luck!

Brandon Cox, Oakdale, CA
Tamiya Wild Willy 2

Affectionately referred to by its owner as "Willy the second," the classic Tamiya Jeep is Brandon's favorite way to enjoy the terrain of Sawmill Mountain in California. The truck has Futaba radio gear, and this picture was snapped while Brandon was out "... having way too much fun." Brandon's only wish is for somebody to come up with a 4WD conversion.

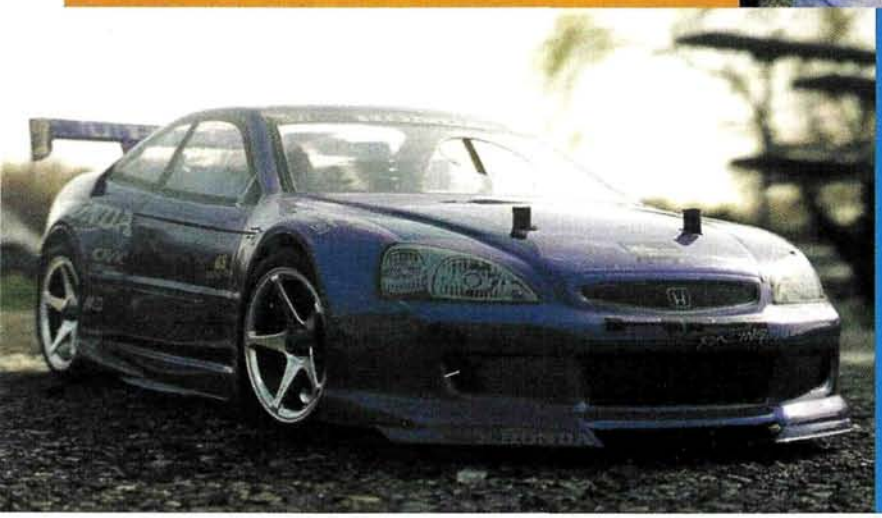
Shane Knight, Troy, MO
Traxxas Nitro Stampede

One of the things Shane enjoys most about Readers' Rides is that it gives him a chance to see other people's cars and trucks. This Stampede is his first nitro-powered vehicle, one that he airbrushed himself. The Pro-Line F-150-body monster is equipped with RPM wheels, a Robinson steel spur gear and more upgrades planned for later.



Karly Greenberg, Vancouver, WA
Traxxas T-Maxx

If you race in the T-Maxx class in Vancouver, WA, get ready to do battle with Karly; we're told that she holds her own on the track. Some of the upgrades that she has installed are MIP shock shafts, a Hitec steering servo, Traxxas wheel hubs and tuned pipe, plus GPM's graphite brake and 12-fin cooling head.



Hector F. Nieto, Corona, NY
HPI Nitro RS4 Racer 2

Nice shot of this Honda Civic SI. The on-road racer carries an MT .12 engine, an extensive list of HG and Wolfpack alloy components as well as HPI's 2-speed, X-pattern radials, Superstar wheels and side belt tensioner. A Mugen exhaust manifold and an RB racing pipe round out the list.

Readers' **Rides**

Jean Carl Gionet, Montreal, Canada
Custom Batmobile

It's amazing what you can accomplish with epoxy, patience and a pair of Mantua Devil kits. Jean constructed his TV-style Batmobile over the course of a year and a half. This incredibly detailed car has functional lighting, an AM/FM stereo, a pair of sirens and leather interior. For fast response around Gotham City, Jean installed both a .21 engine and working rocket assist. Dual parachutes slow the 33.5-inch-long car after a burn.

Matt Egan, Greenville, WI
Team Losi NXT

This stadium truck is a father-and-son effort, but son Matt paid for it with the money he earned last summer working at McDonalds. The truck sports a Pro-Line Silverado body and Pro-Line tires, RPM wheels and a paint job inspired by a body Matt saw here in the magazine. The NXT has a .12 Dynamite engine and Futaba radio gear.

Jay Kopycinski, Gilbert, AZ
Associated RC10T Conversion

This tube-frame sand buggy is based on the RC10T but has a track that's wider by 1½ inches. Jay used a front beam system from an old Tamiya Sand Scorcher to complete the suspension. The chassis was brazed together by Jay, and he hand-fabricated the aluminum pan. This is just one of his many tube creations. The car has Pro-Line paddle tires and HPI Superstar wheels.

James Little, Glendale, AZ
OFNA Monster Pirate

Take one part Barbie-size Rolls Royce, add a dash of Monster Pirate, and you end up with the "High Roller." This unique monster was repainted from its original molded pink, and James added his own decals using transparency film. That's an Elvis figure driving, and you can just make out the top of Scooby Doo's head in the passenger seat. Hey, it could happen. ■

Pit Tips

ILLUSTRATIONS BY DAVID BAKER

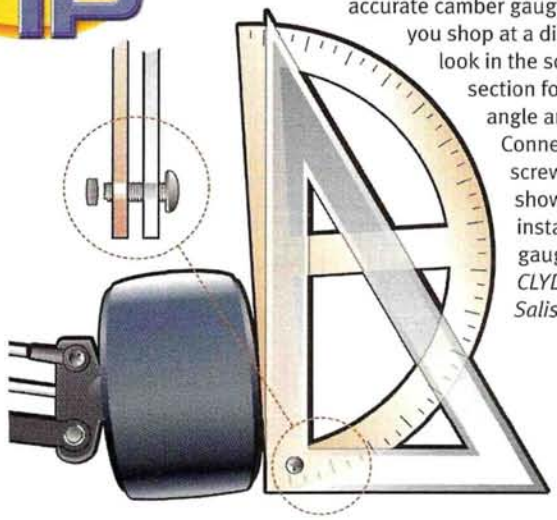
WIN AN OFNA Z-10 RALLY! ***Radio Control Car Action*** **will give a 6-month subscription (or extend an existing subscription) to the author of each idea used in "Pit Tips." "Top Tip" winners will receive an OFNA Z-10 Rally kit. All published "Pit Tip" authors win an OFNA yo-yo. Send a rough sketch to Bob Hastings, c/o** ***Radio Control Car Action***, **100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one nor return unused material.**

TOP TIP

Low-Buck Camber Gauge

You don't need to spend a lot of money for an accurate camber gauge. The next time you shop at a discount store, look in the school-supplies section for a drawing triangle and a protractor. Connect them with a screw and a nut, as shown—presto, instant camber gauge.

CLYDE EADER
Salisbury, MD



Chrome Removal

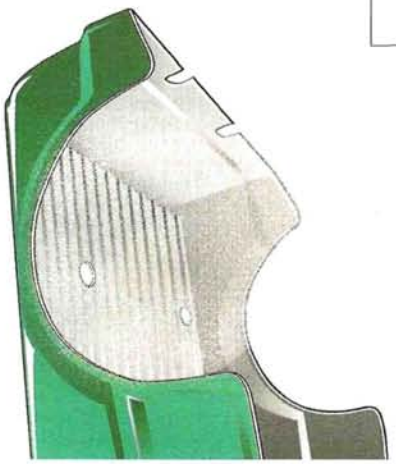
If you want your tires to stick securely to chrome rims, you must thoroughly remove the rims' shiny surfaces (unless you have the latest Pro-Line chrome rims). Use an eye dropper or a rolled scrap of Lexan to funnel a little lacquer thinner around the rim. This will soften the chrome plating enough for you to wipe it away. Be sure to work in a well-ventilated area.

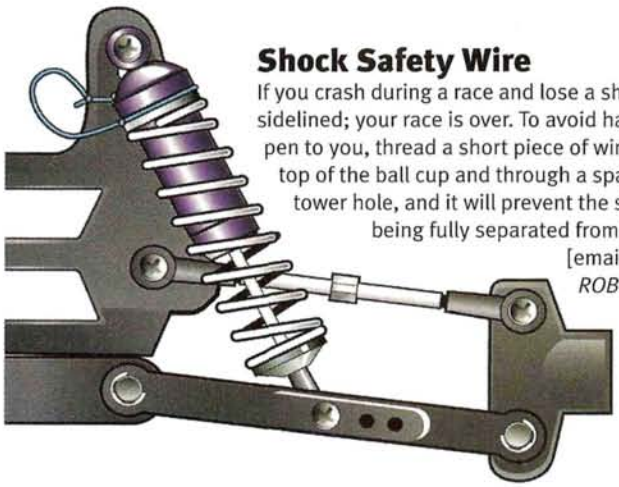
HADLEY JR. HIGH SCHOOL RC CLUB
Wheaton, IL

Quicker Cleanup

After you've run it a few times, the inside of your nitro off-road vehicle body will be caked with dirt and fuel residue that can be difficult to clean off a painted surface. Spray the body with automotive spray wax, let it stand for a while, and you'll find that cleanup takes only a fraction of the time.

[email]
CARL SHEA





Shock Safety Wire

If you crash during a race and lose a shock, you're sidelined; your race is over. To avoid having this happen to you, thread a short piece of wire through the top of the ball cup and through a spare shock-tower hole, and it will prevent the shock from being fully separated from its perch.

[email]
ROB STRAIN

Temp-Gun Tether

Pick up one of those recoil-type key-chain tethers and attach it to the loop on your gun. The gun will retract out of the way when it isn't being used, and you won't leave it on the pit table by mistake.

TONY CARUSO
St. Louis, MO

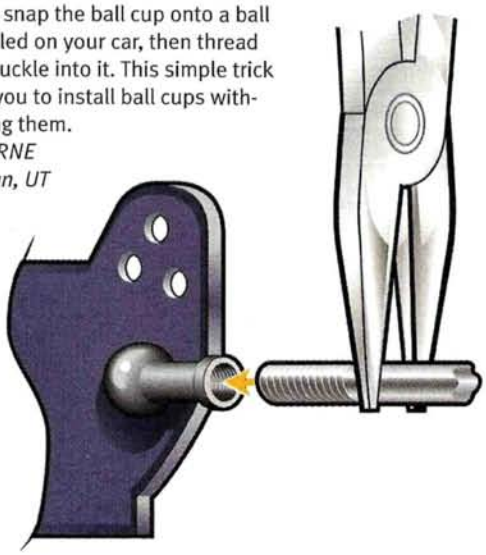
sponsored by OFNA Picco

Pit Tips

Better Ball Cups

You can easily damage ball cups if you hold them too tightly with pliers. To avoid this, snap the ball cup onto a ball stud installed on your car, then thread your turnbuckle into it. This simple trick will allow you to install ball cups without scarring them.

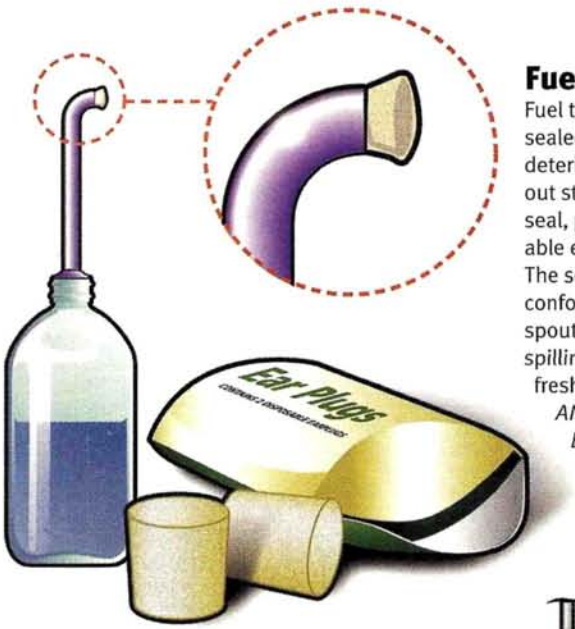
BRIAN HORNE
West Jordan, UT



Imitation Anodizing

If you like the looks but not the prices of anodized-aluminum wheels, spray your chromed-plastic wheels with Tamiya's clear red or blue paint. The paints are translucent, so they let the chrome's natural shine through and look as exotic as those big-dollar wheels. [email]

CHAD HARPER



Fuel-Bottle Plug

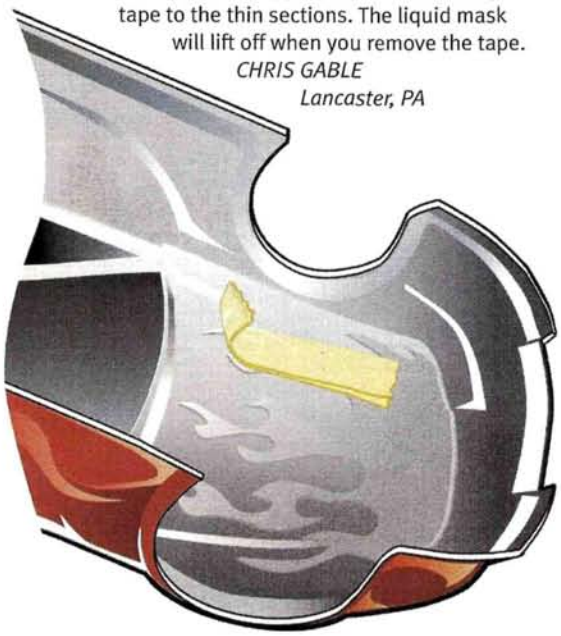
Fuel that is stored in a poorly sealed container will eventually deteriorate. To replace a worn-out stopper and make a tight seal, pick up a pair of disposable earplugs at a pharmacy. The soft earplug material will conform precisely to the fuel spout, prevent the fuel from spilling and keep your fuel fresh.

ANTHONY NEWMAN
Edison, NJ

Liquid-Mask Removal

Liquid mask that has been spread too thinly can be difficult to peel off an RC car body. Don't try to scrape it off; when the paint is dry, apply overlapping layers of masking tape to the thin sections. The liquid mask will lift off when you remove the tape.

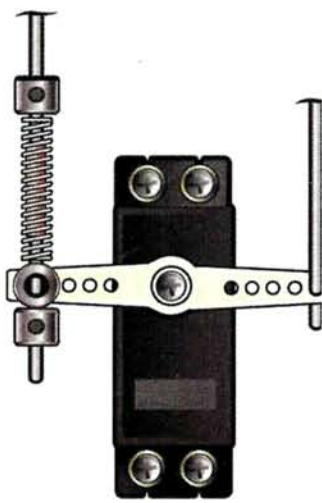
CHRIS GABLE
Lancaster, PA



Glitch Prevention

Some gas cars are subject to radio interference caused by the throttle-return spring rattling on the carb linkage. Cover the linkage with heat-shrink tubing where it contacts the spring, and you'll avoid the metal-on-metal contact that leads to glitching.

JOSHUA KEHS
Kutztown, PA



"Pit Tips" are submitted by readers and are screened for functionality, feasibility and safety but are not tested by *Radio Control Car Action*. *Radio Control Car Action* and the submitting authors are not responsible for personal injury or damage to models or tools resulting from readers' use of "Pit Tips."

sponsored by

Troubleshooting

BY GEORGE M. GONZALEZ

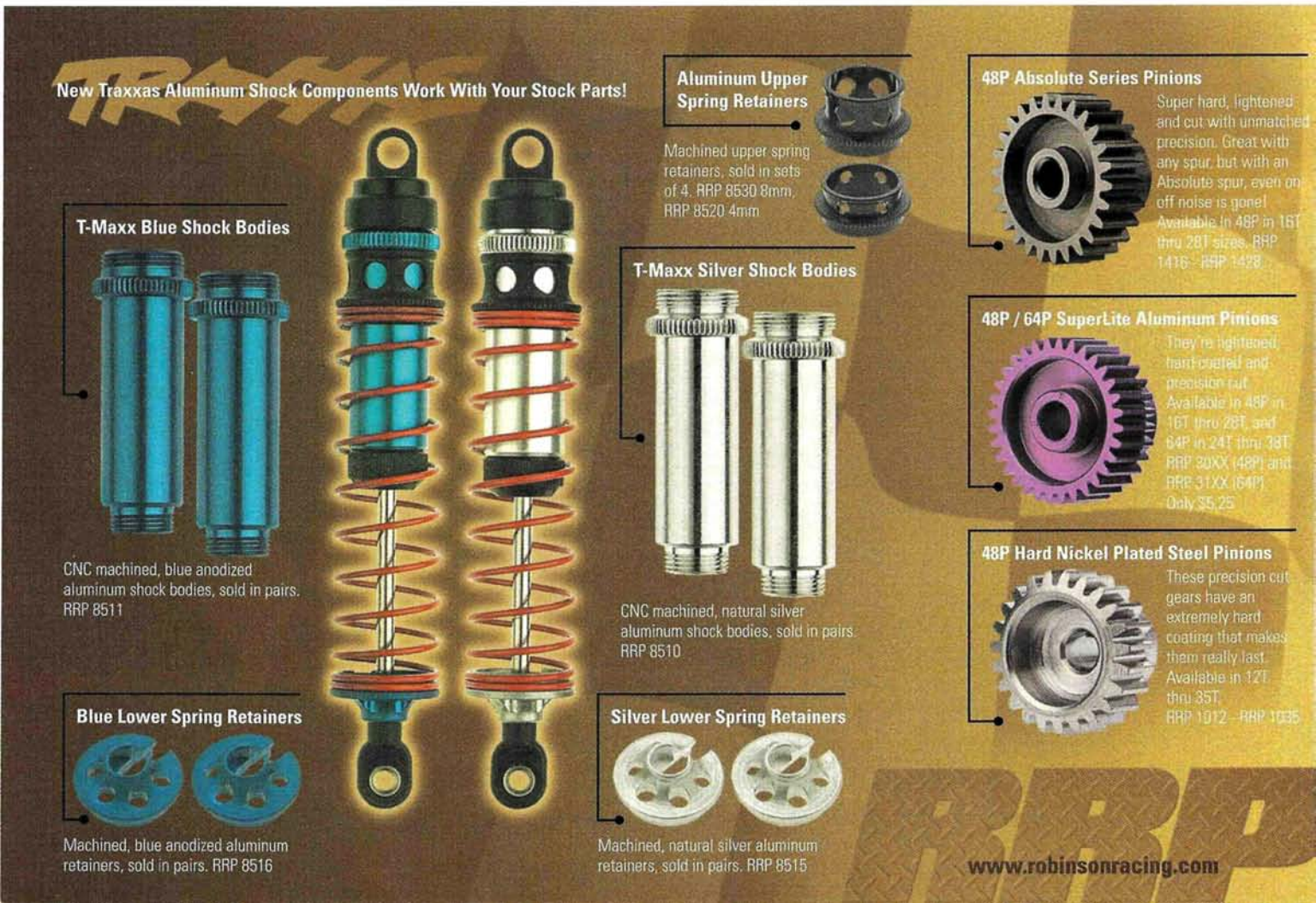
If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at *Radio Control Car Action*. Questions should be of a technical nature and should be emailed to georgeg@airage.com, or addressed to Troubleshooting, *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

Pesky E-Maxx Antenna

I bought a Traxxas E-Maxx RTR monster truck because I wanted a T-Maxx but didn't want the hassles associated with nitro power. The truck runs great, but for some reason, the antenna tube keeps coming loose from its mount. I tried to compress the antenna mount with pliers, but the tube still comes loose. Is it OK to glue the antenna to the mount with CA, or can you recommend some other quick fix? [email]
PHIL WIESLEY

I suspect that the antenna tube is pulled loose from the molded-in antenna mount when the truck rolls over in a crash. The E-Maxx body has an antenna-tube exit hole on the front windshield, and this puts the antenna tube in a rather vulnerable spot. If the truck rolls over onto its lid, the antenna tube becomes pinched between the truck's body and the ground, and the weight of the truck will pull the antenna tube out of its mount. Make a new antenna hole on the rear window (below the roofline); this should solve your problem.

Above left: when this Maxx takes a tumble, there's a good chance the antenna will be pinched between the body and the ground and get yanked out in the process. Right: to make the antenna pinch-proof, make a new hole in the Maxx's rear window and feed the antenna straight out over the bed.



It isn't the Slipper!

I have an Associated RC10B3, and the slipper clutch makes this awful, high-pitched whining before it fully engages. It has been making this sound ever since I built the car in July 2000. I have rebuilt it several times and have tried running it tight and loose, but nothing works. I was beginning to think that the noise was normal—so you could actually hear if it's set correctly—but then I remembered that I used to have an original RC10 equipped with the optional Stealth tranny and slipper clutch, and it never made any high-pitched, whiny-grinding noises. All I heard was the pads slipping—a noise similar to sanding wood with sandpaper. I'm really at a loss here. Any advice you can offer will be appreciated.
SCOTT COSTANZO, Mobile, AL

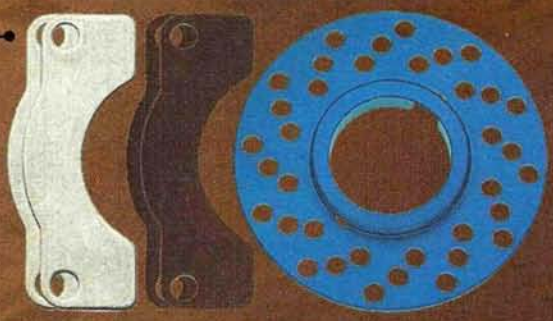
After reading your letter, I charged up a battery pack and headed out to my front yard to play with my B3's slipper clutch. I set it up very loose and performed a few acceleration tests. The slipper clutch made a smooth, slipping sound, similar to your "sanding wood" description. I then tightened the slipper clutch completely and tried again. As expected, the clutch did not slip at all, and the buggy pulled a giant wheelie but there wasn't a sanding-wood sound. Finally, I left the slipper clutch locked and loosened the ball differential a little. As I knew it would, the buggy made a loud, chirping noise before it launched forward (the telltale sound of a loose diff). I believe the awful high-pitched whining your buggy is making is caused by a loose diff. The B3's diff can be adjusted externally with an Allen driver by removing the right-hand drive shaft. If the diff still slips after tightening, or doesn't slip but feels gritty or notchy, you'll have to open up the gearbox and rebuild it with fresh diff rings and diff balls. The differential should not be allowed to slip at all—even when the slipper clutch is completely locked.

Above left: to adjust the differential on Associated and Kyosho off-road vehicles, you must first remove the drive axle; then you can turn the diff screw to tighten the diff. Above right: Losi diffs can be adjusted without disassembly. First, lock the diff by lining up the slot in the diff screw with the slot in the outdrive; then slide a screwdriver or a thin Allen wrench into the outdrive to hold the parts together. Right: to adjust the diff, just turn the right wheel—clockwise to tighten and counterclockwise to loosen.

NEW T-Maxx Steel Diff Gear Set

T-Maxx / E-Maxx differential gear set, includes: 1 beveled pinion gear, 1 beveled spur gear, 4 re-usable stainless steel phillips head screws, 1 tube Associated Black Grease, and a shim kit for spider gears with 10 .003" shims. 2 sets needed per truck. RRP 8590

NEW T-Maxx Aluminum High Performance Brake Kit



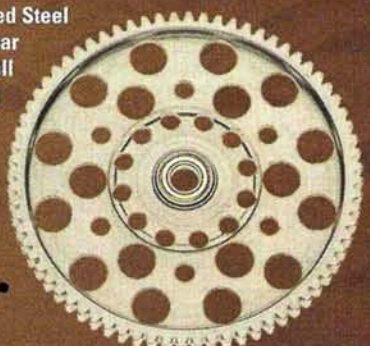
New, lightweight aluminum high performance brake kit, includes bigger, more aggressive brake pads and steel backing plates. One piece vented rotor minimizes side-to-side wobble. RRP 8560

www.robinsonracing.com

T-Maxx Vented Flywheels

Aluminum vented flywheels move air over clutch bell, improving performance and cooling. RRP 8551 Blue, RRP 8550 Natural Silver

Hardened Steel Spur Gear With Ball Bearing



Precision CNC machined from solid steel, and then hardened, these spurs will last and last. RRP 8572 T-Maxx and Nitro Rustler, RRP 8565 Nitro Stampede

ROBINSON RACING PRODUCTS

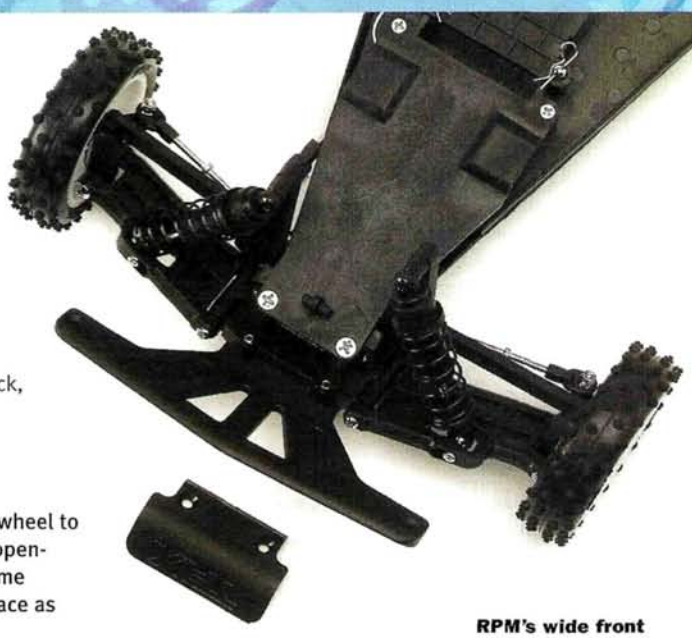
4968 Meadow View Drive · Mariposa, CA 95338 · Voice 209.966.2465 · Fax 209.966.5937

RRP
ROBINSON RACING PRODUCTS

Troubleshooting

Roughed-Up Rustler and Bruised Bandit Beef-Ups

Please help. I bought a Traxxas Rustler truck and a Bandit buggy with painted bodies and electronic speed controls so my son and I could race each other. I chose the Rustler after reading about it in the "2WD Sport Truck Shootout" in your March 2001 issue, and shortly afterward, I bought the Bandit for my son's birthday. The vehicles run great and we really enjoy racing them, but we're always breaking suspension parts by crashing them into curbs, trees and each other. Are there any hop-ups available for these vehicles that will help beef up the suspension? We would eventually like to start racing at our local off-road track, so can you please recommend some parts that will make our vehicles more race worthy? [email]
GEOFF

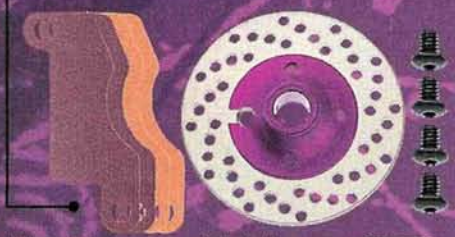


RPM's wide front bumper fits the Bandit, Rustler and Stampede, and it provides much more protection for the front-end parts than the stock mini-bumper.

The Traxxas Rustler and Bandit are tough RC vehicles; you guys obviously race wheel to wheel! Breaking a suspension arm (or another suspension component) on any open-wheeled vehicle is to be expected from time to time; as your driving skills become sharper, you will find that you crash less frequently, and you won't need to replace as many broken parts. In the meantime, here are a few hop-up suggestions.

Equip the vehicles with big bumpers. RPM makes a wide front bumper (part no. 81162; $6.95) that replaces the Rustler's (and Bandit's) tiny stock front bumper. This part alone will provide plenty of crash protection, but I suggest that you install front hinge-pin tie bars, or braces, on both vehicles as well. Traxxas offers a fiberglass front tie bar (2532; $4), but to complete the installation, you'll also need 44mm suspension pins (2640; $2.50—also from Traxxas). The tie bar links the front suspension arms for greater strength. You'll need only the appropriate tires and a selection of silicone shock fluids (25 and 30WT) to start racing. Both the Rustler and the Bandit have standard 2.2-inch wheels, which means that you won't have any problems finding tires that will hook up at your track.

RS4 Nitro Aluminum Brake Kit

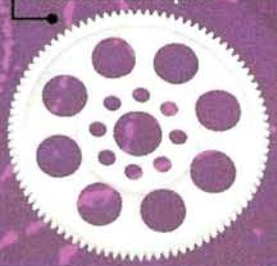


Lightweight aluminum, variable braking system. RRP 1575

RS4 Nitro Vented Flywheel

Aluminum vented flywheels move air over clutch bell, improving performance and cooling.
RRP 1570
RRP 1571 Pull Start

Stealth Sedan Spurs



These precision machined spur gears are super quiet. They're available in 48P in 60T thru 96T sizes, and fit any HPI electric car or truck.
RRP 1860 thru RRP 1896.

RS4 Nitro Small Aluminum Drive Pulleys

Hardened drive pulleys, sold in pairs.
RRP 1538

RS4 Top Shaft Pulley

One piece pulley and shaft are precision cut and hard anodized. Purple anodized side flanges are pressed on. RRP 1527

RS4 / Pro / Pro2 / Nitro Aluminum Outdrives

40% lighter than stock ball diff outdrives. RRP 1585

www.robinsonracing.com

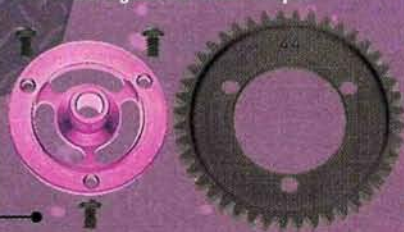
RS4 Complete Ball Diff Units

Hardened steel outdrives, ground and polished thrust washers, 2.5x8mm ball bearings, and aluminum pulley.
RRP 1590 Electric
RRP 1595 Nitro

RS4 Diff Pulleys

Precision machined, hard anodized aluminum diff pulleys.
RRP 1539 nitro sedans
RRP 1528 electric sedans

RS4 Nitro Lightened Gear Adapter



This lightened gear adapter includes a machined nylon spur that's tougher than the stock gear and will last longer.
RRP 1535

RS4 Nitro 32 Pitch Conversion Kit is available. RRP 1536

Short Run Time

I recently purchased a Tamiya F-150 4WD race truck. I built it with the stock bushings, an old Novak 410 M5 speed control and an old modified motor. I have two relatively new Piranha 1500 SCX 7.2V batteries and a 12- or 13-year-old Kyosho convertible quick charger. I only get 5 minutes of run time at the most. It seems as though I just get started, and then I have to change the battery again. Anyway, I am discouraged. Any recommendations on changing my setup or advice on how to get a longer run time? Thanks. [email]
LAWRENCE SKINNER

I'm not sure which type of mod motor you use, but 5 minutes of run time from 1500mAh batteries sounds reasonable (especially for a 10-year-old motor!). I compete in both on- and off-road mod classes, and my vehicles usually get a little more than 5 minutes of run time on 2400mAh battery packs! Granted, that's 5 minutes of straight racing, but under recreational conditions, I might be able to squeeze 6 or even 7 minutes from the same batteries. If you want more run time, I suggest you pick up a competition stock motor. Today's motors are much more efficient and provide higher levels of performance, so chances are, a new stocker might just outperform your old mod motor and provide long run times to boot.

You mentioned that you also have an old Kyosho charger. Is it properly charging your batteries? They should be slightly warm after the charging process. If they aren't, the battery pack will need additional charging. If the charger has a timer, set it for an additional 5-minute charge, but monitor the battery temperature closely during the second charge cycle. The moment the battery pack becomes slightly warm, disconnect it from the charger. If your batteries don't warm up after the second charge cycle, you might want to consider replacing your old battery charger. ■

TOOLBOX

OFNA Ratcheting Ball Driver

This is one of my favorite tools. The ratchet mechanism is a wrist-saver when installing long, machine-thread screws into plastic (think Yokomo and Schumacher), and the Allen bits feature hardened shafts and a ¼-inch shank that makes them perfect for use in a power driver (for experienced modelers only). In addition to the included Allen bits, the ball-shaped ratchet handle accepts all ¼-inch screwdriver, Torx and nut-driver bits (not included, but available at any hardware store).

OFNA ratcheting ball driver—part no. 10311 (metric, w/1.5, 2, 2.5 and 3mm bits), 10312 (standard, with 3/32-, 1/16-, 5/64- and 0.050-inch bits); $30.

RC10-GT Steel Combo

Precision machined from solid steel, then hardened, this 65T spur and 15T bell combo will last and last. The extra-hardened clutch bell fits ALL Associated and MIP shoes. RRP 2365

Hardened Steel Idler Gear

Cut from solid steel stock, this gear is lightened and hardened for super quiet precision and extra long life. Jammin' tranny grease is included. RRP 2213 RC10-GT, RRP 7505 Ultima GP-R

Associated Titanium Stealth Top Shaft

CNC Machined from solid titanium, this super hard, super light top shaft will fit any Stealth transmission. RRP 1512.

www.robinsonracing.com

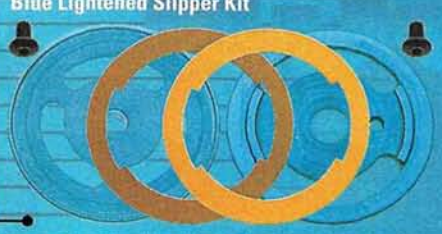
Hardened Diff Gear

Hard anodized, precision CNC machined aluminum diff gear. RRP 1513 RC10-GT RRP 7500 Ultima GP/EP-R

Aluminum Outdrives

40% lighter than stock ball diff outdrives. RRP 1475 TC3, RRP 1502 B3/T3

Blue Lightened Slipper Kit



The rear plate is hard anodized and the front plate is color treated. The front plate holds the pad forcing it to slip on the rear plate. When pad wears, just flip it over for a new surface. RRP 1515 Associated, RRP 7515 Kyosho Ultima

TC3 Ultra 48 Pitch Spurs

Precision machined from heat-resistant plastic, these spurs mesh flawlessly with our pinions. Available in even numbers from 70T thru 80T, RRP 1670 RRP 1680.

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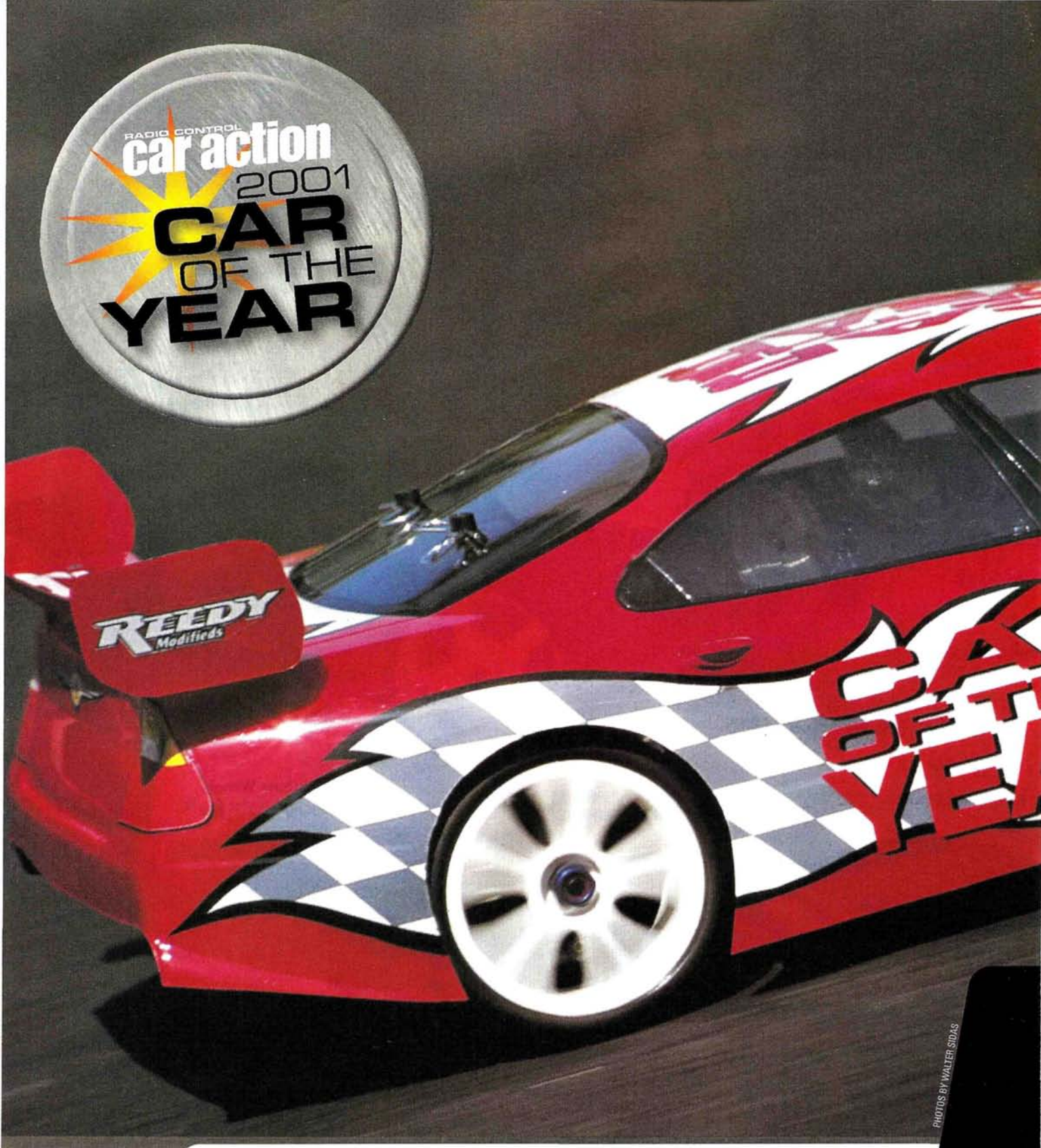


PHOTOS BY WALTER SIDAS

Last issue, you had your say with the Readers' Choice tallies; this month, the editors have their say, as we choose the 2001 Car of the Year. It's never an easy decision, nor one we take lightly: Car of the Year and next month's Truck of the Year are the most important calls we make, and we work hard to make what we believe is the best pick. This year, the list of candidates quickly narrowed to one winner that we could all agree on: the Associated TC3 Factory Team.

ASSOCIATED by the staff of RC CAR ACTION

FACTORY TEAM TC3

The Three Flavors of TC3

Though worth every penny, the Factory Team TC3 still isn't cheap. What's a budget racer to do? Get a different TC3! Associated offers three models; here's the spec story:

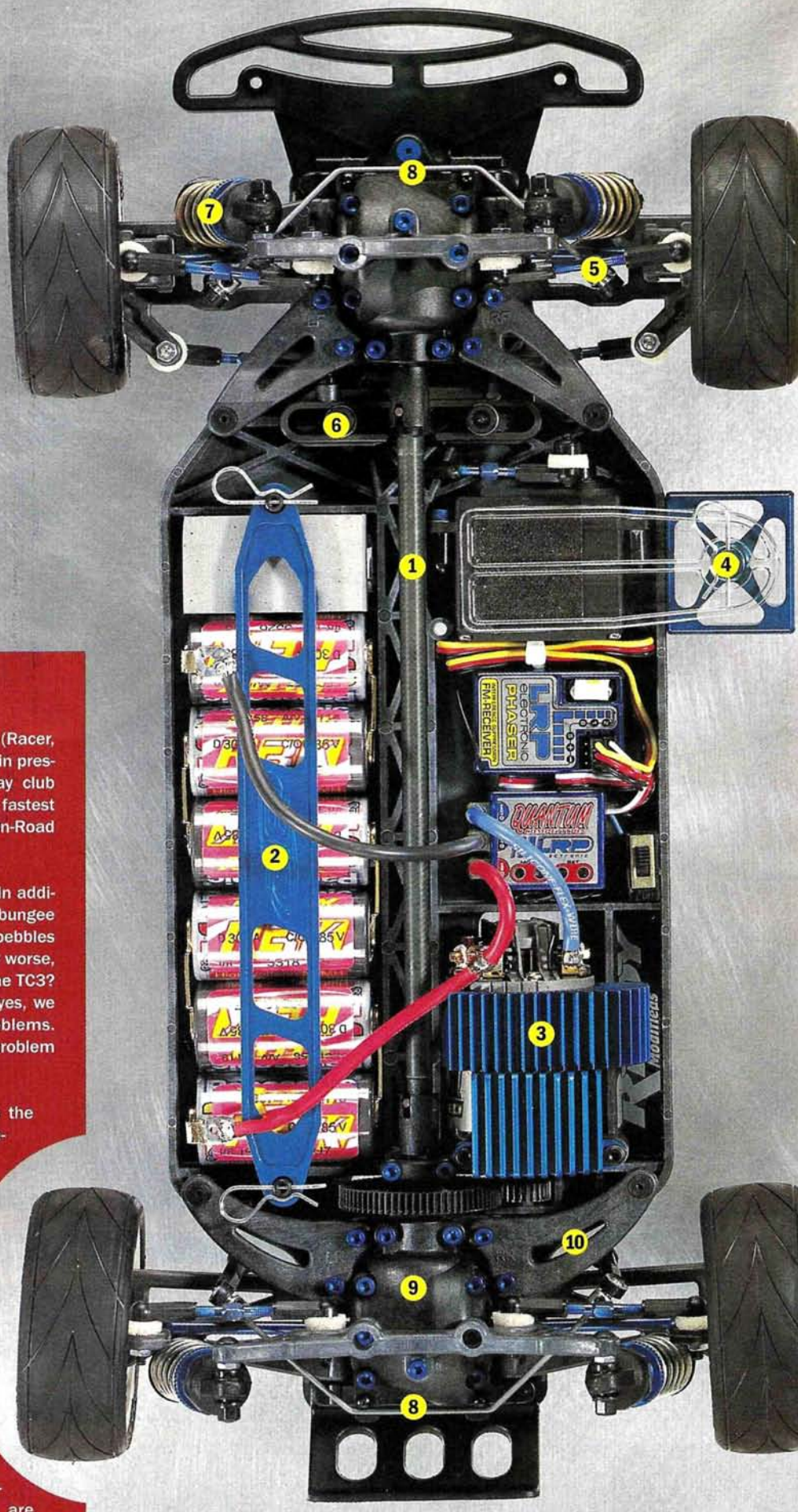
	TC3 RACER	TC3 TEAM	FACTORY TEAM TC3
Body	Protoform	Protoform	Not included
Shocks	Composite	Aluminum	Threaded aluminum
Shock shafts	Stainless	Stainless	Unobtanium hard-coated
Wheels and tires	Pro-Line	Pro-Line	Not included
Drive shafts	Molded MIP CVD	Molded MIP CVD	Aluminum MIP CVD
Turnbuckles	Steel	Steel	Titanium
Bearings	Rubber sealed	Rubber and Teflon sealed	Teflon sealed
Graphite parts	None	None	Full chassis and suspension kit
F&R swaybars	Not included	Not included	Included, front and rear
Street price*	$160	$210	$300

**Approximate; actual price varies with dealer.*

The Factory Team kit also includes a droop gauge, aluminum counterfeit transponder, aluminum clip-on heat sink, machined and anodized motor mount and adjusting cam and an anodized battery hold-down.

car action 2001 CAR OF THE YEAR

1. Shaft drive
2. Machined battery hold-down
3. Clip-on heat sink
4. Counterfeit transponder
5. Factory Team titanium turnbuckles
6. True Ackerman steering rack system
7. Threaded-body, volume-compensating shocks
8. Front and rear swaybars
9. Full blue screw kit
10. Graphite chassis and suspension components



WHY IT WON

● **PERFORMANCE.** The TC3 in all its forms (Racer, Team and Factory Team) has a constant A-main presence in races of all levels, from the Sunday club scene to the IFMAR Worlds. Did you know the fastest single lap at the 2000 IFMAR Electric On-Road Worlds was turned by a TC3? It's true.

● **RELIABILITY.** It's all about the shaft drive. In addition to giving the TC3 the acceleration of a bungee jumper, the shaft setup is impervious to the pebbles and grit that reduce belt life so dramatically, or worse, stop a car dead in its tracks. And the rest of the TC3? It's as tough as tourers come (pundit alert: yes, we know the first TC3s had front-arm problems. Associated beefed up the arms and fixed the problem a long time ago).

● **PRICE.** True, the Factory Team model is the most expensive of the TC3 lineup, but compared with the price of purchasing its many racing upgrades separately, you come out ahead—way ahead, to the tune of more than $300. And, if you consider the Factory TC3's "Car of the Year" win to be an endorsement of the entire TC3 line (and you should), we must consider that the $150 (approximate street price) TC3 Racer kit performs 90 percent as well as the Factory Team kit and includes a body and Pro-Line wheels and tires.

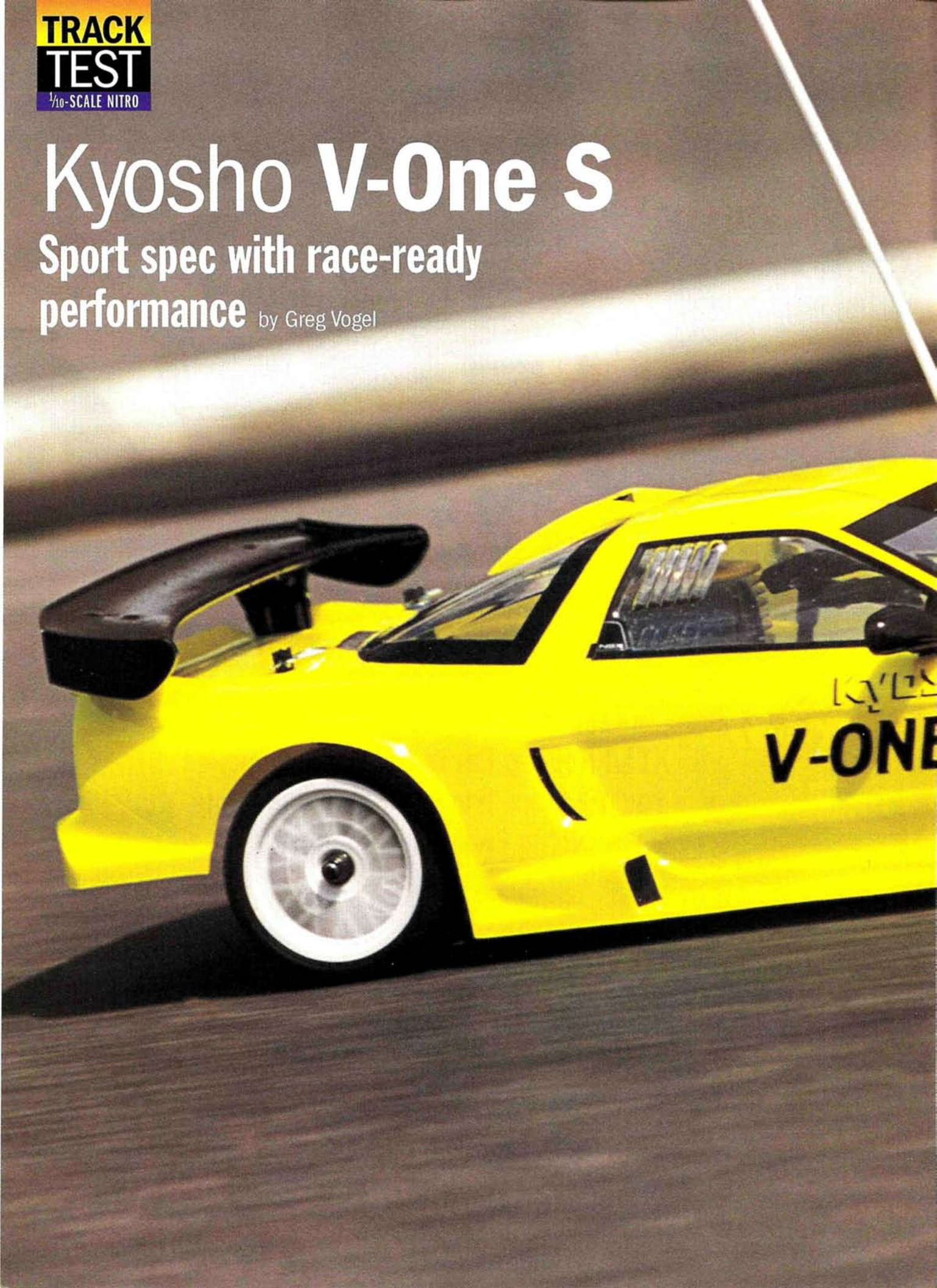
● **HOBBY SHOP AND AFTERMARKET SUPPORT.** There are scads of hop-up and tuning parts for the TC3 from a variety of manufacturers, and stock replacement parts are readily available from the local shop or just about any mail-order outlet. ■

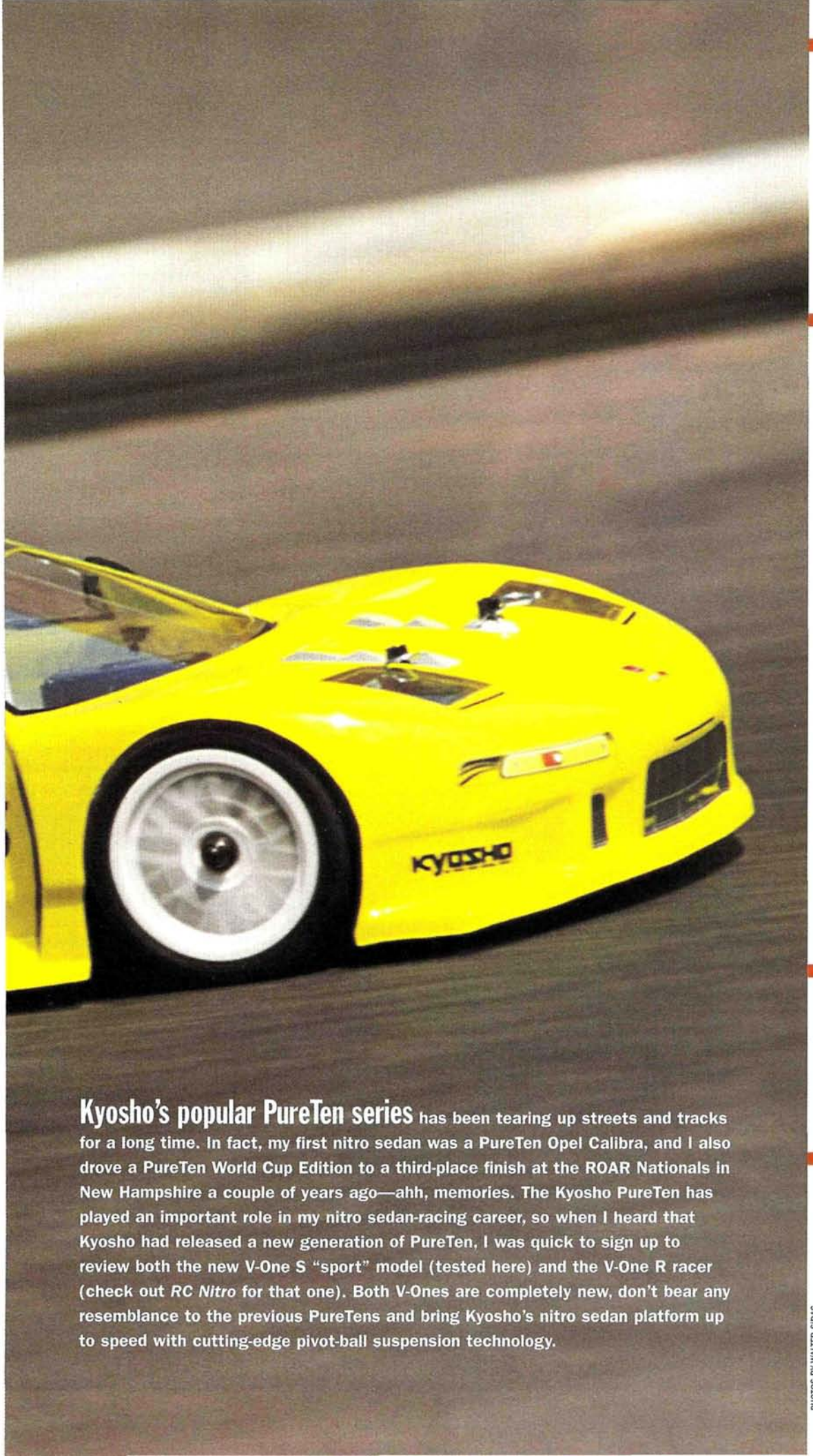
TRACK TEST
1/10-SCALE NITRO

Kyosho **V-One S**

Sport spec with race-ready performance

by Greg Vogel





Kyosho's popular PureTen series has been tearing up streets and tracks for a long time. In fact, my first nitro sedan was a PureTen Opel Calibra, and I also drove a PureTen World Cup Edition to a third-place finish at the ROAR Nationals in New Hampshire a couple of years ago—ahh, memories. The Kyosho PureTen has played an important role in my nitro sedan-racing career, so when I heard that Kyosho had released a new generation of PureTen, I was quick to sign up to review both the new V-One S "sport" model (tested here) and the V-One R racer (check out *RC Nitro* for that one). Both V-Ones are completely new, don't bear any resemblance to the previous PureTens and bring Kyosho's nitro sedan platform up to speed with cutting-edge pivot-ball suspension technology.

DATA CENTER

VEHICLE TYPE 1/10-scale nitro-powered 4WD touring sedan

BEST BUYER RC enthusiast of any level with an interest in nitro power, touring cars and the possibility of racing.

KIT RATINGS (poor, satisfactory, good, very good, excellent)
Instructions Good
Parts fit/finish Very good
Durability Very good
Overall performance Very good

SPECIFICATIONS

SCALE 1/10
STREET PRICE $279.99

DIMENSIONS
Wheelbase 10.22 in. (260mm)
Width 7.84 in. (199.3mm)

WEIGHT
Total, as tested 55.13 oz. (1,563g)

CHASSIS
Type Double-deck, aluminum main chassis w/plastic upper deck
Material 3mm aluminum/plastic composite

DRIVE TRAIN
Type Triple-belt 4WD
Transmission 46T spur/16T clutch bell
Drive shafts Dogbones
Differentials Sealed bevel-gear
Bearing type Metal-shielded ball bearings

SUSPENSION
Type (F/R) Upper and lower A-arm with pivot ball/lower H-arm with pivot and threaded upper link

WHEELS
Type One-piece BBS-type

TIRES
Type Firm rubber slicks with foam inserts

LIKES

- Rigid suspension components with zero slop.
- Radio box includes two doors to suit two receiver-pack configurations.
- Kevlar belts.
- Thick chassis with countersunk screw holes.
- Great parts fit and finish.

DISLIKES

- No pads between the pillow balls and nuts.
- Rear body posts are too short for some bodies.
- A side-belt brace is included, but bearings for it are not.

PHOTOS BY WALTER SIDAS

The linkage here resembles the set up linkage on an original PureTen. It uses a transfer bellcrank to operate the barrel on the carburetor.

The molded receiver box keeps the receiver and its battery out of harm's way. Kyosho includes two doors: one for flat battery packs and one for 2x3 or "hump" packs.

TEST SETUP	FRONT	REAR
Shocks	600WT	600WT
Springs	Stock	Stock
Camber	-1°	-1.5°
Toe	0°	-2°
Caster	6°	–
Chassis height	5mm	5mm
Wheels and tires		
Pro-Line/Jaco purple-compound-foams		

building & setup tips

The kit I received was a production unit, but the instruction manual was still in a development stage. The pictures, however, provided enough information for me to build the car without problems. I assume that the final version of the instructions will make it even easier to build. As far as fit and finish go, I don't think the parts could have fit together any more easily, and when they had been assembled, there was no sign of slop. The finish is excellent—no flashing—and the threads cut into the steering knuckles are perfect. Here are a few tips I came up with while building the car:

Replace the tie rods. I built the V-One S stock, but if I did it again, I would replace the steering tie rods and rear camber rods with turnbuckles. It's much easier to do it then than after you've completed the assembly. In addition, if you retrofit ball cups that were previously installed on the stock threaded rods, you'll have to cross-thread the ball cup on the side of the turnbuckle with the left-hand thread, and this may weaken the ball cup.

Step 8. The instructions tell you to use rubber cement to glue the brake pads to the caliper plates. I found it easier to spray the pads and plates with 3M Super 777 adhesive and then stick them together.

Step 9. Make sure you cut the tabs off the brake adapter; if you don't, the tabs will cause the drive train to bind.

Step 10. This requires that you place a tapered washer on the pulley shaft. Make certain that the taper faces the bearing. It is easy to inadvertently put it on backwards.

Step 19. I suggest you replace the thin green kit oil with genuine silicone shock fluid. The kit oil will get the car on the road, but it's way too soft and will allow the car to sway. I used Mugen 600WT oil as a starting point.

Step 29. The long rod is used here. Step 29 shows a rod that must be cut and bent for the throttle linkage. I looked for a short rod, but in fact, it was a long rod with threads at the end. First bend the long rod then cut it where they suggest.

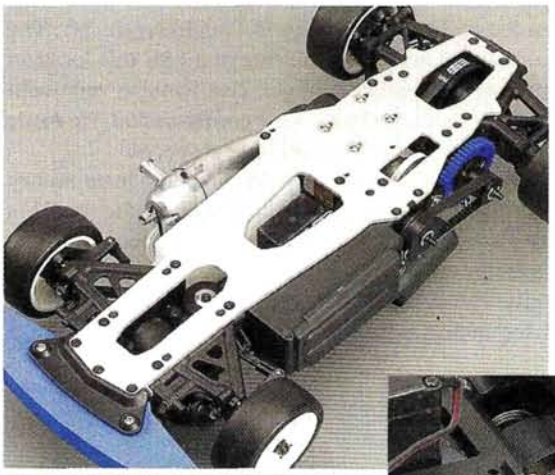
YOU'LL NEED ■ Transmitter and receiver ■ Steering and throttle servos ■ Glow starter ■ Receiver pack ■ Thread-locking compound ■ Tire glue ■ Polycarbonate-compatible paint

FACTORY OPTIONS ■ Rear stabilizer set—part no. VZW003 ■ Front stabilizer set—VZW004 ■ 2-speed transmission—VZW006 ■ V-One shocks—VZ075 ■ Adjustable steering-turnbuckle tie rod—VZ068 ■ Upper camber rod—VZ077 ■ Special machined aluminum engine mount—39648 ■ CZ flywheel—FD49 ■ High-performance clutch shoe—UM210

KIT FEATURES

• **Chassis.** You would think a car with a sport designation would most likely have a 2mm-thick chassis and that the holes wouldn't be countersunk. Well, not this sport car; the V-One S is equipped with a stamped, 3mm-thick Duraluminum chassis with countersunk screw holes and slotted recessed holes for the engine mount. Openings in the bottom allow access to key areas such as the flywheel and the steering servo-saver screw. Those openings also allow debris and sand to fall out.

The top deck is a plastic composite piece with an interesting arrangement for the car's vital components. Both servos are in the center of the chassis. A molded radio box with a hinged cover protects the receiver and the battery, and an extra cover is provided to allow larger batteries or receivers to fit in the box. A flip-top fuel tank on the opposite side of the chassis features a powerful closing spring and inside baffles to reduce fuel sloshing and foaming. Other details impressed me: a plastic mount retains the tuned-pipe wire while providing a place to route the fuel pressure line, and the fuel feed line comes up through a hole in the top deck before being routed to the engine. The center roll bar features a transponder mount and a loop to secure the servo wires, and swaybar mounts are molded to the front of the top deck.



Above: the V-One S is built on a 3mm Duraluminum chassis with countersunk holes and slots to allow the engine to be slid to obtain the proper gear mesh. Key posts help you align the bulkheads on the chassis.

Right: the front suspension is fully adjustable for caster, camber, track, toe, preload and suspension-arm travel (up and down!)—not bad for a "sport" car.

When considering any type of nitro-powered car, one of the first things racers always look for is effective chassis bracing. Kyosho has taken care of business by bolting the top deck to the center pulley shaft mount. From there, an L-shaped brace spans the clutch bell and is bolted to the rear bulkheads. The reinforced-plastic composite brace is very thick and doesn't show any signs of flexing with the "racer's accordion-style flex test."

• **Drive train.** When I pulled the diff bag from the box, I thought I would see recycled diff components from previous Kyosho vehicles. I'm happy to say Kyosho has retired its old touring-car gear-diff design. The new diff is sealed by O-rings that fit into recesses in the diff case. The outdrives enter the case and are mated with the bevel gear using a crosspin. Only two transfer bevel gears are used in the diff, and a felt gasket is provided to seal the diff, which is filled with grease (the "R" kit includes diff fluid). The front diff has an interesting convenience feature: instead of molding the diff pulley into the diff case (as is done with the rear diff), the front differential pulley is attached to the diff case as a separate part. This allows you to change the pulley without opening the diff and dealing with messy grease or fluid. Three wide Kevlar belts link the diff pulleys through a pair of layshafts, and dogbones transfer power to the wheel axles. The shafts and the rest of the drive components ride on metal-shielded ball bearings. Kyosho includes a side brace for the two main shafts, but to install it, you need to buy a pair of optional bearings. Power is put to the drive train through a two-shoe clutch, 16-tooth clutch bell and 46-tooth spur gear.

A vented stainless-steel brakes disc with padded calipers, actuated by a cam-type lever, provides the stopping power.

• **Suspension and steering.** With the V-One kits, Kyosho has moved away from traditional hinge-pin and C-hub systems to pivot-ball-suspended hub carriers. Soft, flexy parts can be expected on most sport kits, but the V-One S uses rigid, molded plastic suspension parts, and the parts are shared with the "R" model. Up front, the lower arms have a wide base at the bulkhead mounting point to reduce

Airtronics M8 radio system
For a "sport" car, I usually drop in an entry-level radio system. After building the V-One S and being impressed with its race worthy features, however, I couldn't bring myself to install anything less than race-quality electronics. I pulled out my Airtronics M8 radio and receiver and programmed one of the 10 memory settings to the V-One S. The M8 conveniently displays all of the programmable features on its large screen and makes fine tuning easy while you're on the drivers' stand.

Airtronics 94257 steering and throttle servo
This servo is a favorite of mine, but it has been discontinued. Its replacement is the new 94357 that boasts a transit time of 0.07 second with 125 ounces of torque. The 94257 has a transit time of 0.06 second but "only" 100 ounces of torque. So if you're looking to gear your V-One S with similar equipment, the 94357 is a great choice.

Team Sidewinder fuel
This was my first experience with Morgan's new car fuel. The fuel contains "CP-07"—a special additive that, according to Morgan, reduces the friction between the engine's moving parts and reduces wear. The GS-15R engine fired up easily and idled well with Sidewinder fuel.

OFNA 1000 NiMH 5-cell flat receiver pack
Kyosho supplies two battery/receiver doors: one for larger battery packs and one for flat packs. I bolted on the flat-pack door and slipped in a flat OFNA receiver pack for long run times in the parking lot.

THE COMPETITION

	Suspension	Bearings	Diffs	Shocks	Engine*	RTR w/radio gear	Street price**	Reviewed
DuraTrax Street Force GP	Hinge	Yes	Ball	Aluminum	Torq .15 PS	Yes	$300	9/00
HPI Nitro RS4 RTR	Hinge	Yes	Gear	Plastic	Nitro Star .15 PS	Yes	$300	4/99
Kyosho V-One S	**Pivot ball**	**Yes**	**Gear**	**Plastic**	**GS-15R PS**	**No**	**$279**	**1/01**
OFNA Z-10 RTR	Hinge	Yes	Gear	Plastic	Force .12 PS	Yes	$290	–
Traxxas Nitro 4-TEC RTR	Hinge/pivot	Yes	Gear	Plastic	TRX-15 ES	Yes	$319	4/99

This vehicle category is too large to include all comparable vehicles. Cars listed alphabetically by brand. All feature nitro power and full-time 4WD.
**PS- pull start, ES-electric start. **Approximate; price varies with dealer.*

the chances of its breaking in an impact. An aluminum hinge-pin brace further reinforces the front end, and an up-stop arm with a setscrew is mounted on the front of the arm. The front of the bulkhead contains the down-stop screws, so the V-One's suspension travel is easy to adjust. The swept upper arm is attached to the bulkhead with a hinge pin that is retained by a setscrew, and three clips allow caster to be adjusted by sliding the upper arm fore and aft on the hinge pin. Large pivot balls enter the steering knuckle and are held by concave pillow-ball retainers. On the upside, the retainers were the easiest I've ever installed in any pivot-ball-equipped car. On the downside, the retainers don't have plastic cups to pad the pivot ball, so the steel balls ride directly on the aluminum retainer. Will the parts wear quickly? Only long-term testing will tell.

Kyosho equipped the V-One S with tall rear hub carriers to reduce the effects of chassis roll. Notice how the hex adapter has a lip toward the back to keep dirt out of the ball bearings.

In the rear, H-arms are used with a pivot ball on each side of the outer arm. The hubs feature a high-rise upper link mounting point to raise the roll center and bring it closer to the chassis' center of gravity. The upper links are composed of heavy-duty captured ball ends and threaded rods that can be adjusted by removing them and twisting their ends. Turnbuckles would be nice, but the adjustability of threaded links is still a step up from the one-piece links found on many other "sport" kits.

Plastic composite shocks topped off with gold-anodized caps damp all four corners. The seals are installed in the bodies, generic green oil is supplied to fill them, and black springs take care of the rebound. The rear shock tower offers three upper shock-mounting locations. Two towers are supplied up front. A low shock tower that is more of a brace than a tower is bolted to the front bulkhead with the shocks. The low-profile setup is required for use with the included Acura NSX body, but Kyosho supplies a taller tower with three upper-shock mounting locations for use with bodies that have more room above the fender wells.

The steering servo is mounted upside-down in the center of the chassis. Kyosho supplies a heavy-duty servo-saver with an aluminum center ring and adapters for servos with toothed outputs. The saver is linked to the steering knuckles with threaded rods.

• **Engine and accessories.** A Kyosho GS-15R engine powers the V-One S. The .15 mill is equipped with a recoil starter and two-needle barrel carburetor. A gold-anodized heat-sink head tops the engine, and a glow plug has already been installed. To allow the engine to breathe, a cone-type filter slides over the carburetor intake, and on the other end of the cycle, a header is bolted to the side exhaust port and coupled to a cast, two-piece, tuned-style pipe.

Instead of being bolted directly to the chassis as Kyosho does with many of its cars, this engine is bolted to an adapter plate which is then mounted to slotted holes in the chassis.

• **Body, wheels and tires.** I tested the V-One S with its included Castrol Acura NSX body and full decal sheet to replicate the real racecar, but I went for a "street" look. Although not my first choice for a competition body, the NSX looks great with or without the Castrol treatment and sets the V-One S apart from the usual Accords, Stratuses and Mercedes. Where the rubber meets the road, you'll find firm Kyosho slicks with foam inserts and BBS-type rims. They get the car rolling and work fine in parking lots, but if you plan to race, you'll want to trade up to stickier rubber.

PERFORMANCE

To test the V-One S, assistant editor Derek Buono and I packed up our gear and headed to Tarmac Raceway in Poughkeepsie, NY. The paved track is permanent and is on the side of a hill; this location gives it some impressive elevation changes. The layout is very technical, and blocking off sections changes the configuration; we made up a track that would really put the S through its paces.

The GS-15R engine fired up in a few pulls but was a little finicky to tune. When it was running optimally, the high needle was 1 1/16 turns out, and the low was 1 1/4 turns out on a 70-degree day. Once tuned, the engine ran reliably and had adequate power for play, but it did not give the V-One S the strong acceleration and top speed required for racing outside of the Kyosho World Cup; a

Inside the V-One R

The V-One S and the V-One R share many components, yet at first glance, they seem very different. The main differences beteen them are in the center of the cars. The "R" features a narrower chassis and a fiberglass upper deck. The fuel tank, battery and steering servo are all centered in the chassis for best weight distribution; when the fuel tank runs low, the chassis' lateral weight distribution isn't affected. In terms of features, the "R" gets threaded-aluminum shocks, a 2-speed transmission and sticky rubber tires. The V-One S's pivot-ball suspension parts are identical, and both machines use 3-belt drive trains, but in different configurations; the V-One R has a long center belt that passes behind the engine all the way to a shaft up front. With this belt layout, only non-pull-start engines can be used. The "S" model has a short center belt mounted off the side of the spur-gear shaft, leaving plenty of open space behind the engine for a pull-starter. A plastic upper deck is used, and the fuel tank and electronics are not centered because they would interfere with the drive train's long front belt if they were.

The V-One S has plenty of competition potential, but the V-One R is a better choice if you know you plan to race seriously. The V-One S can wear many hop-up parts to increase its performance, but the centered fuel tank, electronics and more straightforward belt layout of the "R" give it an upper hand over the "S" that hop-up parts can't make up for.

2-speed transmission would help on both fronts.

The handling department is where this car really excels. It was close to its stock setup; all I did for the test was switch the shock oil from the generic green sludge to Mugen 600WT oil. The track was a little bumpy and called for the thicker Mugen oil, but the stock medium-rate springs were well suited to the rough stuff. The V-One S was very stable despite the chassis bottoming out on some of the larger bumps. After just a few laps, the chassis was scarred because it had scraped the pavement, but it never faltered.

This car steers! In fact, I had to dial out some of the steering to reduce the twitchiness and the tendency to oversteer. I swapped the stock meats for Pro-Line S3-compound slicks with Jaco medium inserts. With these tires, there was a ton of traction, and I had to back off the steering dual rate even more.

The car's braking impressed me. Plenty of cars easily lock up their wheels, and you can't steer locked wheels. The best braking systems allow precise control of braking pressure to get the tires as close to lockup as possible without overcoming the tires' grip. I was able to get on the brakes hard to set up the V-One S for a tight hairpin or gently scrub speed in a turn without upsetting the chassis. The V-One S's steel brake and padded caliper provided consistent braking through each test run (unlike other sport cars with plastic brake discs that tend to fade or pulse as they wear).

THE VERDICT

After building and testing the V-One S, I think that by labeling it a "sport sedan," Kyosho has underestimated the car's capabilities. Although it is an excellent car for a first-time nitro enthusiast to learn how to drive and tune an engine, with a few modifications, the V-One S is also very capable of competing with other top-level racecars. With a competitive aftermarket engine, a true-tuned pipe, 2-speed transmission, track-appropriate tires and a Dodge Stratus body, if you don't want to stand out from the crowd, the V-One S should be able to run with just about anything. The typical V-One S buyer will run out of driving skill before reaching the limits of the V-One S's performance envelope. ■

SOURCE GUIDE

AIRTRONICS
1185 Stanford Ct., Anaheim, CA 92805; (714) 978-1895; www.airtronics.net.

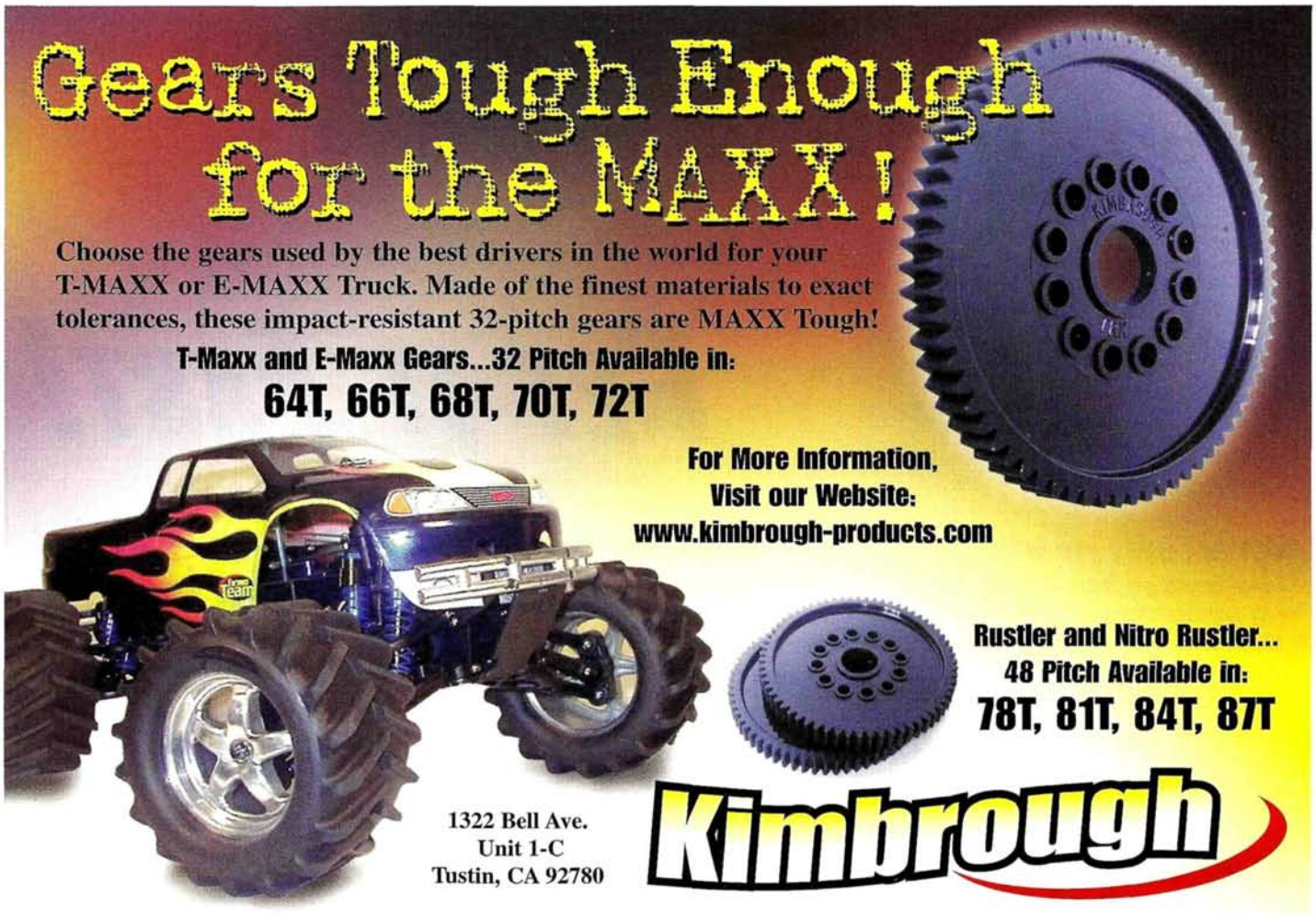
KYOSHO
Distributed by Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948.

TEAM SIDEWINDER
A division of Morgan Inc., P. O. Box 1201, Enterprise, AL 36331; (800) 633-7556; (205) 347-3525;

MUGEN USA
20914 Blake Pky., Ste. 106, Lake Forest, CA 92630; (949) 707-5607; www.mugenracing.com.

OFNA RACING
22692 Granite Way, Ste. B, Laguna Hills, CA 92653; (949) 586-2910; www.ofna.com.

PRO-LINE/JACO
P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; www.pro-lineracing.com.

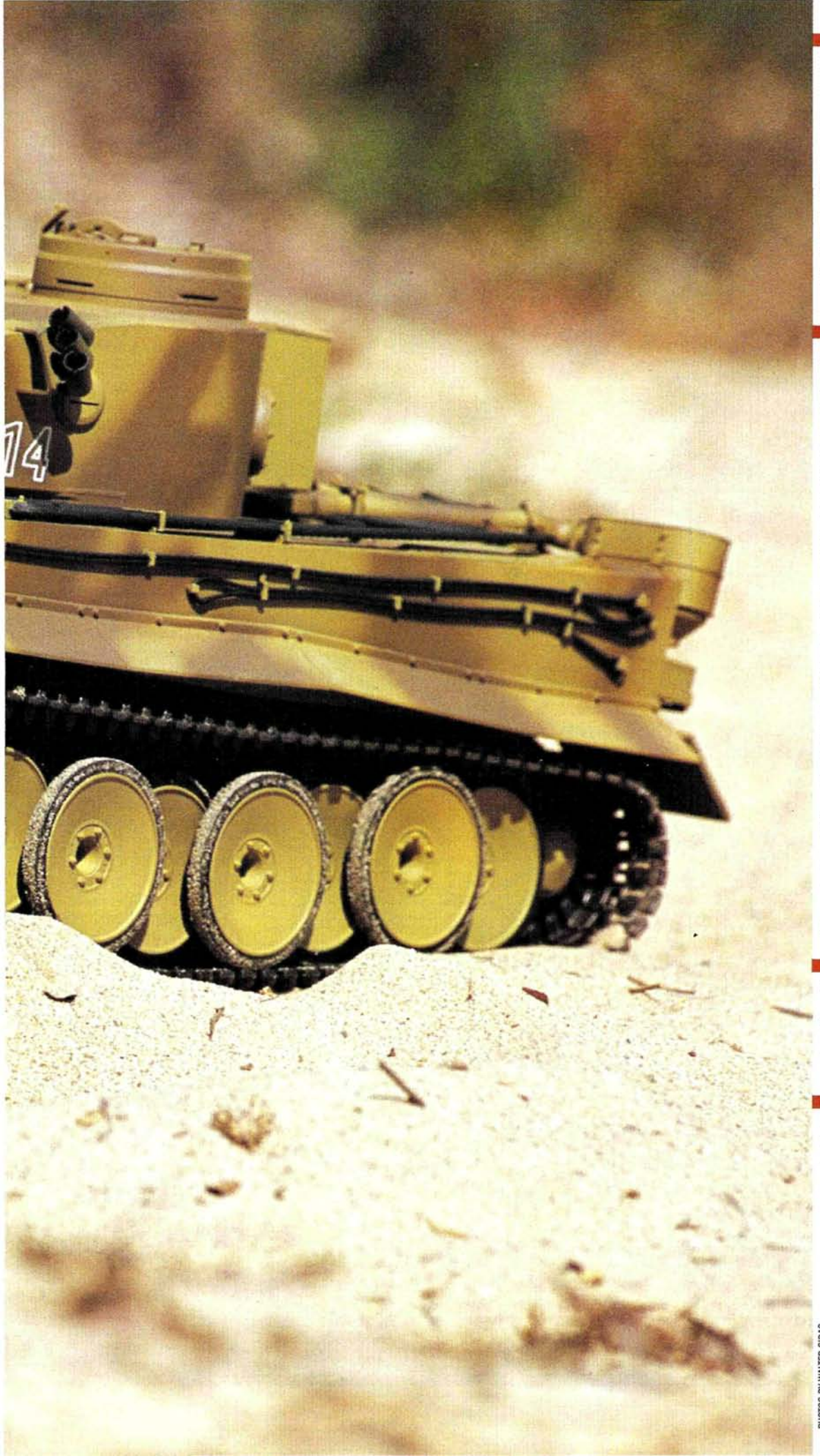


Tamiya **Tiger I**

RC blitzkrieg!

by Kevin Hetmanski

Tamiya is the king of RC tanks—always has been and probably always will be. I can say that with confidence after building Tamiya's Tiger I. It's a full-option 1/16-scale machine that takes realism to a new level. Of course, Tamiya's gold-standard attention to detail and precise molding are very much in evidence, but the Tiger I is also very scale in operation, right down its functional turret with recoiling cannon and simulated firing machine gun complete with authentic synchronized sound effects. Beneath the armor, Tamiya has advanced RC tank tech to a new level with its Digital twin Motor Differential control unit (DMD); this replaces finicky transfer shafts, clutches, and gears with a solid-state electronic speed control engineered just for tracked vehicles. Keep reading, and I think you'll agree; the Tiger I is the ultimate RC tank in terms of performance and realism.



DATA CENTER

VEHICLE TYPE 1/16-scale tank

BEST BUYER Experienced model builders, tank buffs, any RC fan with a taste for something different

KIT RATINGS (poor, satisfactory, good, very good, excellent)
Instructions Very good
Parts fit Very good
Durability Mechanically very good, but static-model-type detailing is easily damaged.
Overall performance Excellent

SPECIFICATIONS

MANUFACTURER Tamiya
MODEL Tiger I Full Option
SCALE 1/16
STREET PRICE $720

DIMENSIONS (chassis only)
Wheelbase (idler wheel to drive sprocket) 12.125 in. (308mm)
Length (hull only) 15.5 in. (394mm)
Length (hull with turret) 20.5 in. (521mm)
Width 9 in. (229mm)

WEIGHT
Total, as tested 149 oz. (4,209g)

CHASSIS
Type Tub
Material Aluminum

DRIVE TRAIN
Type Dual gearbox, dual 380 motors, track drive
Primary Pinion/spur
Bearing type Bronze bushings

SUSPENSION
Type Torsion-bar

INCLUDED ELECTRONICS
- DMD electronic speed control/differential unit
- MF-01 turret/gun control
- Mabuchi 380 drive motors

LIKES

- Tamiya includes every option you could ever want for a tank.
- Functional yet simple suspension system.
- Painstaking, no-compromise detailing.

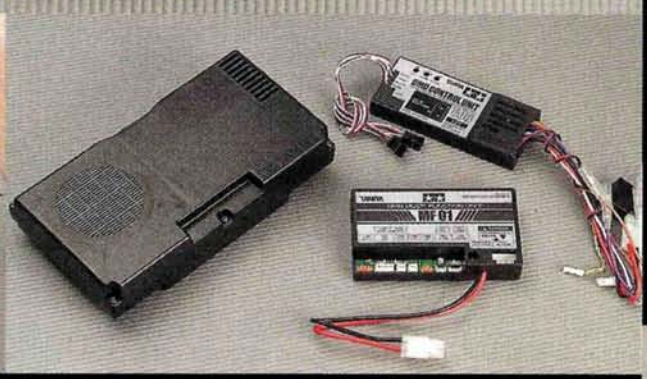
DISLIKES

- Takes a long time to build.
- Some body parts are very fragile.
- Expensive.

PHOTOS BY WALTER SIDAS

With the upper hull removed, we can see that the MF-01 unit and speaker box take up much of the room within the tank. The mechanical bits don't take up much space at all; the gearboxes and motors squeezed into the tank's nose hardly use up ⅕ of the available space. Older Tamiya tanks were packed with gears, pulleys, and clutches, now rendered obsolete by Tamiya's electronic differential technology.

The batteries are under the main turret. They can be accessed by turning the turret until the two small tabs on the bottom of the turret line up with the rectangular openings on the tank's top deck.



The full-option Tiger I comes with the electronic gear shown here. The only things you need to purchase for the tank are the batteries and the radio.

building & setup tips

Like all Tamiya kits, the Tiger I includes a fully illustrated and accurate instruction manual. But be warned: no matter how experienced a builder you are, the Tiger I takes time to assemble properly. There's nothing difficult about it, but it's nothing like building an RC car. Take your time, and you'll have a fine, functional model when you've finished.

Step 33 through 36. The cannon is made up of multiple pieces that must be glued together. When you join the left and right side pieces to make up the main cannon, take the time to properly align the two halves before the glue sets. The cannon will not slide in and out of the gun mantelet smoothly (that's tank-talk for the armor on the front of the turret) if the halves are not aligned properly, and this may cause the gears of the recoil mechanism to jam. After the glue has dried on the cannon, test-fit it in the gun mantelet to make sure it slides easily. After attaching the small gearbox to the cannon, plug it into the MF-01 unit and test-fire the big gun. If the cannon jams, it will be easier to fix the problem before you glue the rest of the pieces to the turret.

Painting tips. Clean the parts with soapy water before painting them. If you decide to duplicate the camo scheme I sprayed, I suggest you use an airbrush for the job. An airbrush makes painting much easier because it gives you better control of the paint, and you won't get any drips or fill in the fine details on the parts. Paint small parts while they are still attached to their parts trees. Assemble the entire tank and add the camouflage stripes last. Place tape over the tracks before adding the camouflage to prevent the paint from getting on them.

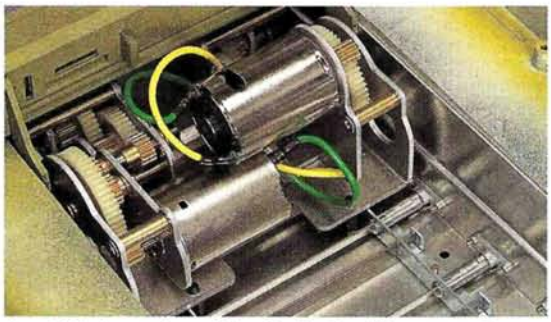
YOU'LL NEED

- 4-channel transmitter and receiv
- Two 6-cell stick packs
- Charger
- CA glue
- Plastic model cement
- Enamel paint for static models

KIT FEATURES

Chassis. The chassis tub is stamped out of lightweight aluminum plate and is little more than an open-ended box. Sixteen suspension-arm supports are fitted to the tub, along with steel rails that secure the torsion bars. The assembly is lowered into a plastic, realistic-looking lower "hull" that covers the aluminum chassis tub and forms the bottom half of the tank.

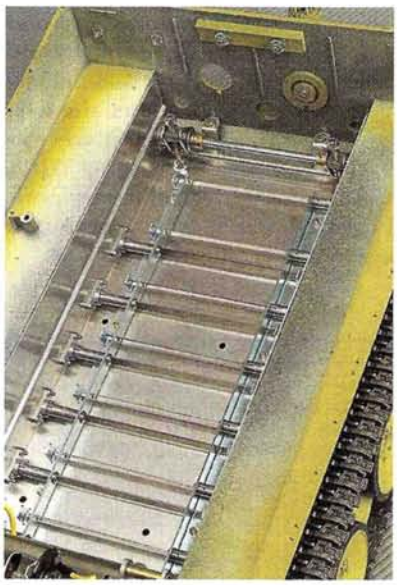
Drive train. Two 380-size Mabuchi motors drive the tank's tracks through a pair of independent gearboxes; each track has its own factory-assembled transmission that is easy to install in the front of the chassis tub. Gearbox output shafts poke out of the sides of the lower hull to accept large, metal drive sprockets that drive the tracks. Twenty-four rubber-capped plastic wheels ("road wheels" in tank-speak) suspend the tank and support the tracks, but are not powered. The last wheel in each row of road wheels is an idler wheel. The idler wheels are mounted to a common axle that passes through a small cam inside the chassis; to adjust track tension, adjust the cam via a screw that's accessible through the bottom of the tank. The tracks are made of multiple plastic treads that are held together with small pins. Some previous Tamiya tank models required the builder to assemble the track links—an exercise in mind-numbing tedium—but Tamiya has assembled the tracks for you in the Tiger I kit. Extra treads are included in case any need replacing.



Two 380-size motors drive the tank, with a separate gearbox for each track. The tank isn't very fast but the high gear ratios allow it to climb over anything.

As mentioned, each of the Tiger I's tracks has its own motor and gearbox. Since a tank is steered by varying speeds of the tracks, a special speed control is required to operate the Tiger I. Basically a large, multi-function ESC, Tamiya's DMD controls the steering, forward and reverse, cannon elevation and turret rotation functions of the Tiger I. When combined with the MF-01(multi-function) turret controller, the DMD unit also controls cannon recoil, flash unit and machine-gun firing.

Suspension. The Tiger I features a unique torsion-bar suspension system. Each road wheel is suspended by the twisting action of a flat strip of spring steel. These strips are called "torsion bars," and they couldn't be simpler. One end of each bar is fixed inside the chassis; the other end is attached to a short, cast lever arm outside the chassis, to which the road wheel is mounted. As the road wheels move upward and downward in response to bumps, the lever arm twists the torsion bar to absorb the impact. There's no damping mechanism, but with so little travel and the built-in damping effect of the track system, the ride remains bounce-free.



Each guide wheel has its own flat metal torsion-bar suspension. One end of the torsion bar is captured, and the other end is keyed to a cast lever arm on which the guide wheel rides.

Futaba 4VF-FM 4-channel radio

The Tiger I requires a 4-channel radio system, so I chose the Futaba 4VF-FM radio for the task. It features FCC-legal 75mHz operation, two-stick control, servo-reversing switches, Ni-Cd transmitter and receiver packs, receiver switch, charger, four S3004 servos and a 7-channel receiver. The extra two channels are for the weapons; the tank can be driven without turret control on just two channels with standard RC gear.

Orion 2400mAh matched stick packs

A matched pack is overkill in a tank, but I had a pair of these Orion beauties, so in they went. The Tiger I needs only a single pack to drive; the other pack powers the turret mechanisms and weapons. If you're buying packs just for the Tiger I, a 3000mAh pack will give the most run time for driving around, and any cheap stick pack will keep the turret turning and the guns firing for the duration of your run.

ACHTUNG!

The German Tiger I tank was developed in 1941, and it was considered to be one of the most powerful and feared tanks of WW II. The Germans pumped out more than 1,000 of these monsters during the War. The Tiger I required a well-trained crew and a lot of maintenance to keep it running. Despite its size, it was a very maneuverable, but it could not reach the speeds of some of the smaller, lighter tanks in the German fleet. It carried armor that was as thick as 4 inches and weighed in at a whopping 56 tons (that's more than I can bench press). Within its armored hull, the Tiger I was divided into four sections: driver compartment, bow-gunner/radio-operator compartment, turret-fighting compartment and engine compartment. Tiger I features also included:

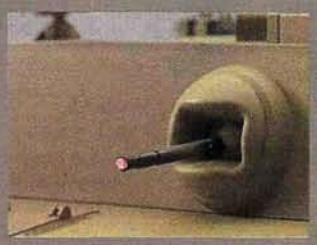
- **88mm long-range cannon**
- **7.92mm machine guns**
- **Smoke dischargers**
- **Torsion-bar suspension**
- **700hp Maybach HL 230 P45 V-12 gasoline engine**
- **725mm wide track**

PERFORMANCE

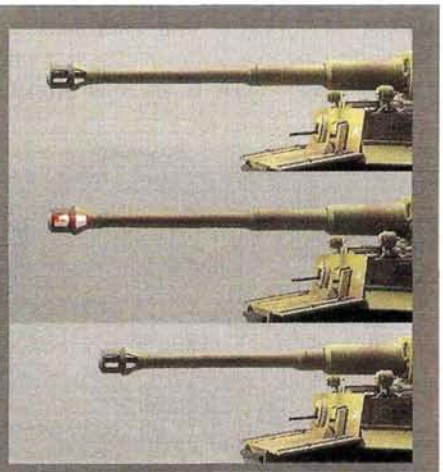
It's always a thrill when you go out for the first run with a freshly built vehicle, but I was particularly psyched—and nervous—about running the Tiger I. Not only did I have a lot of detailing time wrapped up in the fragile injection-molded body, but the tank is also expensive. In any case, I didn't want to goof it up! I clicked the tank on, and the sound system made realistic starting noises and then revved up as I motored away. Once I was used to the controls and was sure that everything was working properly, I drove the tank over to an area that was covered with dirt. Since it is quite heavy and is powered by 380-size motors, I figured it would have a tough time on hilly terrain, but the reduction gearboxes and tenacious tracks dug in, and the Tiger I attacked the inclines with authority; nothing could stop it. Like the full-size Tiger I, the model's top speed was nothing to write home about (that's the downside of those torque-producing gearboxes), but its scale speed was perfect. The tank's suspension absorbed the uneven terrain very well. Steering control was surprisingly precise; the Tiger I made turns as sharp or shallow as I liked, and it turned a pirouette when I rotated the tracks in opposite directions. All the "special effects" functions worked reliably, too; I expected them to be fiddly, but they never glitched. Firing that big gun never gets old!

Special Effects

With all its scale detail, the Tiger I is impressive enough just sitting there, and radio control adds another level of realism and excitement, but it's the operational turret, cannon recoil, machine-gun flashing and realistic and loud sounds that are perfectly synced to each function that really draw a crowd. These functions are made possible by the MF-01 unit, which is linked to the DMD controller, and features its own speaker system. The MF-01 unit reproduces seven genuine tank sounds: engine starting (via manual crank or electric starter), idling, running and stopping; machine-gun fire, and cannon fire. The visuals that go with the sounds are equally impressive. When the machine gun is fired, muzzle-flash is simulated as an LED lights up the barrel via a fiber-optic rod, and when the main cannon is fired, a strobe light in its tip flashes brightly as the barrel recoils into the turret! You really have to see it to appreciate it; log on to rccaraction.com for video of the tank in action.



A small fiber-optic rod in the machine-gun barrel is attached to a small red LED inside the tank. It makes the gun look as if it is really firing.



Take a look at the sequence of pictures, and you'll see the big cannon recoil into the tank's turret.

Battle System

The Tiger I realistically creates the look of firing weapons, but it doesn't shoot real projectiles (please contain your disappointment). That hasn't stopped Tamiya from waging "real" battle with the tanks though; thanks to clever infrared technology, the Tiger I can shoot and disable another tank when each combatant is equipped with Tamiya's Battle System. It is fully compatible with the MF-01 unit and can create a wide variety of sound effects and actions: damage blast, engine trouble, speed loss, blast reduction (lengthens the time between blasts), limited-operation state and an inoperative state. The Battle System has a firing range of 98 feet, and it can be personalized to suit your vehicle with light tank, medium tank and heavy tank modes. Battle limits can be set by programming the number of blasts that the tank can endure and the length of time between firings. When a Battle System-equipped tank takes an infrared "hit," it jerks slightly and emits a damage-blast sound, and the lights on the unit flash to let you know your tank has been damaged. After a certain number of hits, a loud "explosion" sound will come from the tank, and its "engine" will shut down. After about 15 seconds the Battle System resets and allows the tank to be invulnerable for a few seconds to allow you to do some evasive maneuvering.

THE VERDICT

I'm confident that the Tiger I is simply the most impressive piece of RC armor the hobby has ever seen. Its scale realism makes it worthy of static display or use as a movie miniature, but the Tiger I isn't about sitting still; it was built for action. Its track system delivers powerful torque and traction, and the operable turret and weaponry add a new dimension to radio control. The only downside of the package is its price; although I think $700 is not unreasonable given the model's size, the included electronics, the tooling required to produce the tank's many parts and relatively low volume of kits Tamiya is likely to sell (compared to, say, a TL01), there's no getting around the fact that $700 is a lot of money! Sure, you could buy a really awful used (full-scale) car for that much dough, but trust me: you'll have more fun with the Tiger I. ■

SOURCE GUIDE

FUTABA
distributed exclusively by Great Planes Model Distributors Co., P.O. Box 9021, Champaign, IL 61826; www.futaba-rc.com.

TAMIYA AMERICA INC.
2 Orion, Aliso Viejo, CA 92656-4200; (800) TAMIYA-A; fax (949) 362-2250; www.tamiya.com.

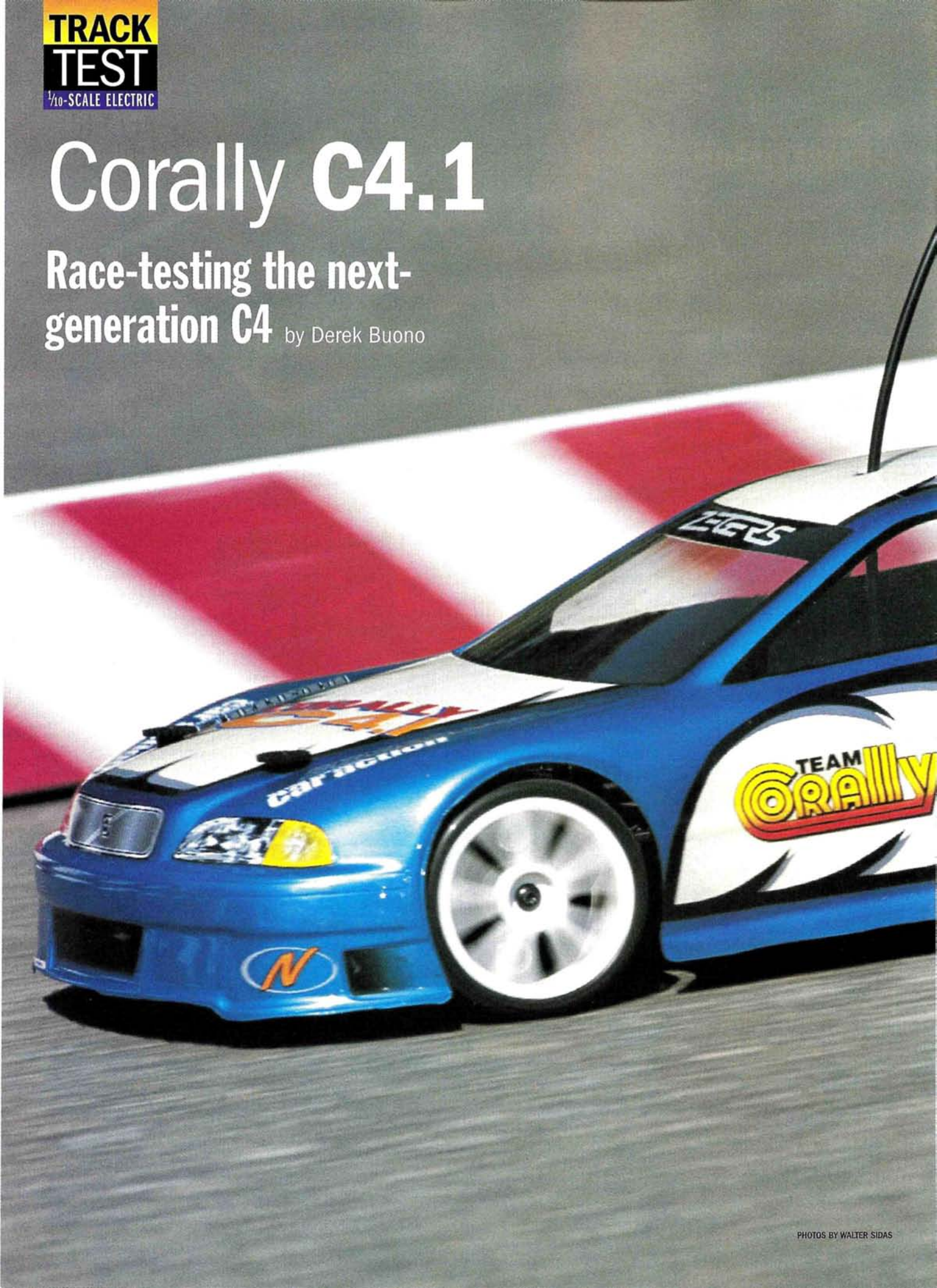
TEAM ORION INC.
22601 La Palma, Ste. 103, Yorba Linda, CA 92877; (714) 694-2812; fax (714) 694-2815; www.team-orion.com.

TRACK TEST
1/10-SCALE ELECTRIC

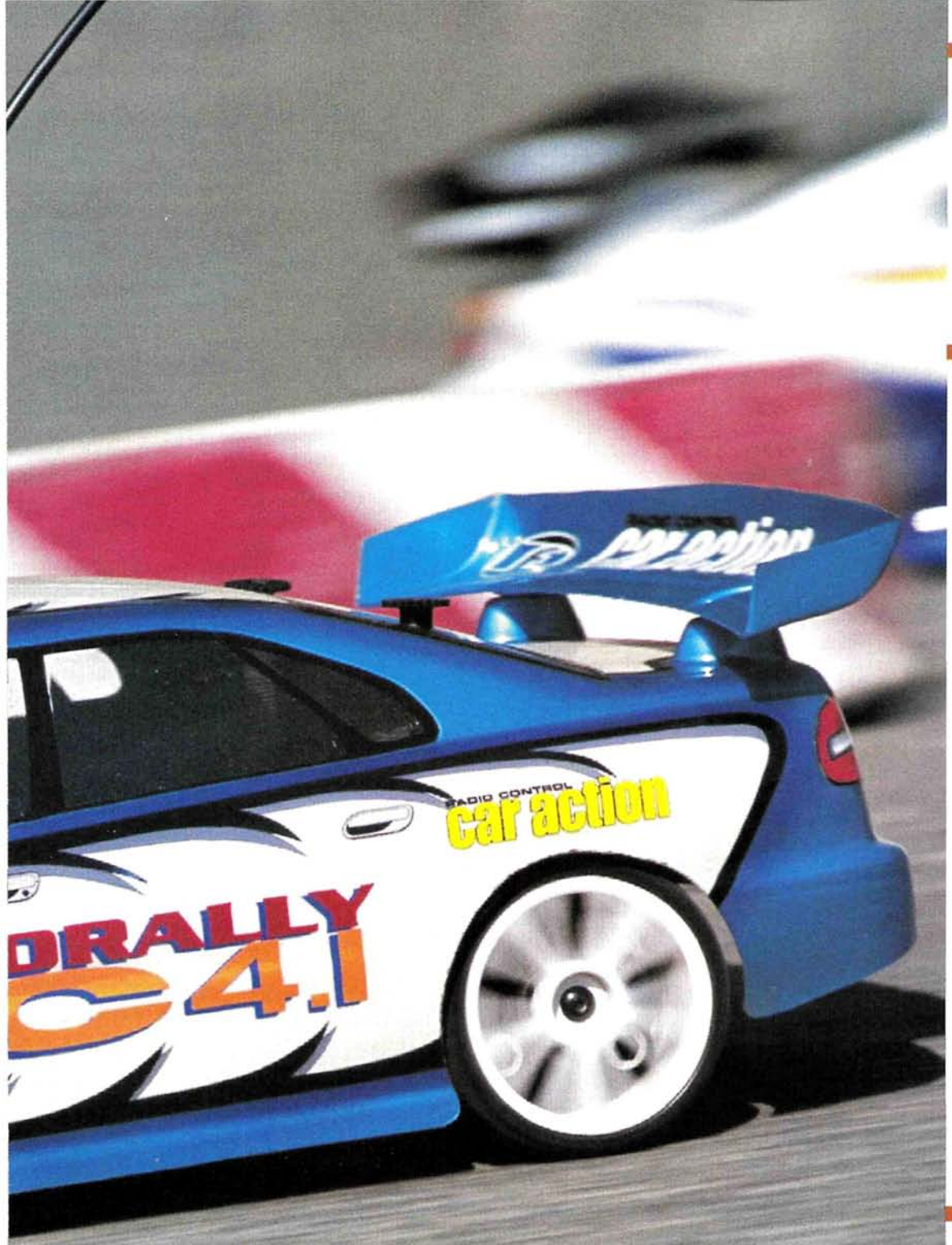
Corally C4.1

Race-testing the next-generation C4

by Derek Buono



PHOTOS BY WALTER SIDAS



Corally pioneered the development of pivot-ball suspension in electric touring cars with the original C4, which was equipped with suspension components from the Serpent Impact—a 1/10 nitro on-road racer. The new suspension technology quickly became a hit on the European race scene, as the C4 won the European title in its debut race. Corally hasn't rested on past victories, however; in an effort to keep the C4 on top, the company has steadily improved it since its launch. The result? The new C4.1, a subtly but significantly revised chassis that comes out of the box track-ready with a ton of features and adjustments to satisfy the most obsessive tuners. The C4.1 is ready for the track; are you?

DATA CENTER

VEHICLE TYPE 1/10 4WD electric touring car

BEST BUYER Mid- to high-level racer who wants a high-performance sedan

KIT RATINGS (poor, satisfactory, good, very good, excellent)
Instructions Good
Parts fit/finish Excellent
Durability Very good
Overall performance Very good

SPECIFICATIONS

MANUFACTURER Team Corally
MODEL C4.1
DISTRIBUTED BY Specialized R/C Intl.
SCALE 1/10
STREET PRICE $359.95

DIMENSIONS
Wheelbase 10.40 in. (260mm)
Width (F/R) 7.56 in. (189mm)

WEIGHT
Total, as tested 52.3 oz. (1,494g)

CHASSIS
Type Double deck
Material Woven graphite

DRIVE TRAIN
Type Dual-belt 4WD
Transmission Pinion/spur
Drive shafts (F/R) Constant-velocity axles
Differentials (F/R) Ball
Bearing type Metal-shielded bearings

SUSPENSION
Type (F/R) Upper and lower A-arm/lower H-arm with adjustable upper link
Damping Oil-filled, coil-over, threaded-plastic shocks

WHEELS
Type Corally by Take Off 6-spoke plastic

TIRES
Type Corally by Take Off rubber racing slicks

LIKES

- Pivot-ball suspension adjusts easily and precisely without disassembly.
- Shock damping and caster can be adjusted without tools.
- Excellent parts quality.
- Ready to race; no mods required.

DISLIKES

- Diff access is complicated.
- Only certain rims fit without hitting the hub carriers.
- Special battery clips are easy to lose and aren't common in shops that don't support Corally cars.
- Difficult to install and remove batteries unless a long jumper wire is used.

Large openings below the diffs allow debris to fall out of the chassis. The kit includes plastic trays that hold the cells snugly in place.

building & setup tips

The C4.1 is a little tricky to build in some spots, and sometimes, the instructions don't do the best job of guiding you through the assembly process. Here are a few tasks that required some extra time and attention:

Drive-axle assembly. Corally does its best to show you that the axles and the drive hexes are different lengths in the front and rear. To avoid getting them mixed up, pay attention to the drawing.

Battery construction. I found out the hard way that battery removal is slightly more difficult than necessary. I made a very short jumper that fits underneath the upper deck. Unfortunately, you can't squeeze the batteries through the driveline, and boy, did I try. I had to break down and take off the top deck to get the packs in and out. You can get around this by making an extremely long jumper that connects over the top deck.

Pivot balls. If you're a gas-car junkie, you'll have no problem setting up the suspension. If you're new to the world of pivot balls, however, take your time; get all the wheels pointing in the same direction, and get the proper width, making sure that one side isn't more offset than the other. A long ruler or caliper will make life easier.

Left: the big front hubs are the same as on the Serpent Impulse. The downside is that those big hubs limit the various wheels the C4.1 can use. Right: the center-point front steering puts the bellcrank in the center of the chassis. The diff is externally adjustable by threading an Allen wrench through the left diff hub and turning the right wheel.

YOU'LL NEED

- Transmitter and receiver
- Steering servo
- Electronic speed control
- 6-cell saddle pack
- 190mm body
- Tire glue

FACTORY OPTIONS

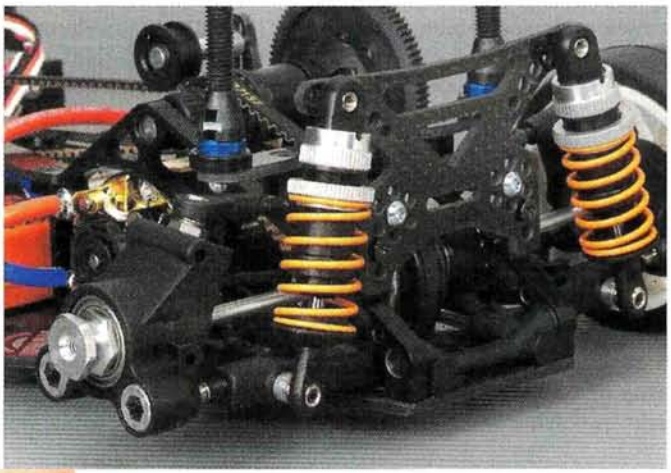
- One-way diff set—part no. 77166.
- Pulley with one-way bearing—77316.
- Front aluminum threaded shock bodies—77221.
- Rear aluminum threaded shock bodies—77226.

KIT FEATURES

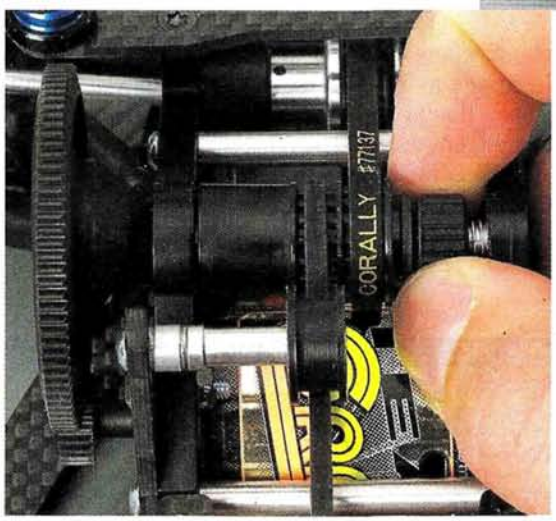
• **Chassis.** The C4.1 doesn't give you a 50-yard fake with fiberglass parts; the kit includes nothing less than a 2mm-thick graphite chassis. The battery slots have been moved to a staggered position, with three cells on the forward left side and three cells toward the right rear. This allows the speedo to be placed closer to the motor and results in better weight distribution. Several slots have been made in the chassis beneath the motor and the diffs for cooling and to allow debris to fall out. The battery slots have molded plastic linings to protect the cells and provide a snug fit. The upper deck is also woven graphite; it attaches to the front and rear bulkheads and results in a super-stiff chassis.

The battery containment system is one of the best available in any kit. Small plastic clips hold a pivoting graphite strap against the batteries. Remove the clip, and the strap easily comes off to permit access to the cells. Just be careful not to lose the clips, as they are special Corally parts, not plain ol' body clips. All appropriate holes have been fully countersunk, and the screws use a Torx-pattern head; the required Torx wrench is included in the kit.

• **Drive train.** The C4.1 uses a dual-belt system with a 90-tooth spur gear on a fixed main pulley shaft. The front layshaft pulley incorporates a one-way bearing design that can be adjusted to control the amount of one-way action. It is a pressure-actuated design; to activate full-time 4WD, you tighten the adjuster. The rear pulley is fixed to the shaft, and a thick, 4mm-wide belt connects it to the rear ball differential. The front belt is a slimmer 3mm and is connected to the front ball diff. An adjustable-bearing belt tensioner is mounted to the rear bulkhead and adjusts the tension on the front belt. The belt is so slim that it is critical to have the proper tension; otherwise, the belt might skip and wear prematurely. The front and rear diffs use identical plastic pulleys and hardened-aluminum outdrives. The diffs use the aluminum bulkheads as supports and ride on large, 15x10mm metal-shielded bearings. Power from the diffs is transferred to the wheels via constant-velocity axles that have standard-size hexes to fit most wheels. Everything works well, but be sure to assemble the parts right the first time and blow any track debris off the diffs before it gets into the balls because removing the diffs for rebuilding is a major undertaking.



Pivot balls also adjust the rear hub, but a turnbuckle upper link replaces the fixed arms of the C4. Rear camber is now easily adjusted. As you can see from the rear shock tower, tuning options are plentiful. You can also see the washers I had to use to extend the rear body mounts.



The knurled wheel adjusts the preload on the one-way pulley; you can sock it down for full-time 4WD, back it off for a free-spinning front end, or adjust it anywhere in between.

• **Suspension and steering.** If you look closely, you'll see Serpent's trademark snake on the front-suspension arms; that's because they have been lifted straight from the Serpent Impulse. The double A-arm suspension allows fine camber and width adjustments, and the large, front steering blocks have gas-car toughness. As on the Impulse, however, this limits rim choices, and if a compatible rim isn't used, the webbing on the inside of the rim will hit the steering block. The lower front arms each have one shock-mounting position and travel limiters. The lower arm rides on a long hinge pin that is captured between the aluminum bulkheads. This

KO Propo EX-11 radio system
The value of this computer radio is undeniable. With three-model memory, digital trims and end-points and a bunch of other features including exponential, ABS and dual rates, the EX-11 is a great mid-level FM radio.

KO Propo PPS-2143 digital servo
KO's rep for fast, powerful servos was secure before the introduction of the high-frequency models, but now that KO has gone digital, the servos are even more impressive. The PPS-2143's lightning-fast 0.08 transit time and monstrous 111 oz.-in. of servo torque kept the Corally's wheels pointed in the direction I wanted at any speed.

Novak Cyclone TC
Like the original Cyclone, the TC features external solder posts for a custom installation no matter how many cars you swap it in and out of, and three user-selectable throttle profiles (in this case, they're tailored just for touring-car use).

Corally Powers 3000 battery
The Powers cells are relatively new to the market, but they've been popping up more and more. The Corally-matched pack has all the run time you expect of NiMH cells, and the voltage is comparable to Sanyo and first-generation Panasonic 3000s.

Take Off CS-22 tires
I found that the CS-22s hooked up on the slightly warm asphalt. Two other compounds are available for various track temps. Even as the track's surface temperature increased, the tires showed few signs of wear. The CS-22s are ideal for cooler track temps.

Protoform Volvo S60 body
I know it's heresy to run anything other than a Stratus on a competition tourer, but I like the Volvo's lines, and it's still a blunt-nosed shell, so it handles well. The included window masks and detail decals make even a single-color paint job look good, but I turned to Bill Zegers for a pro finish.

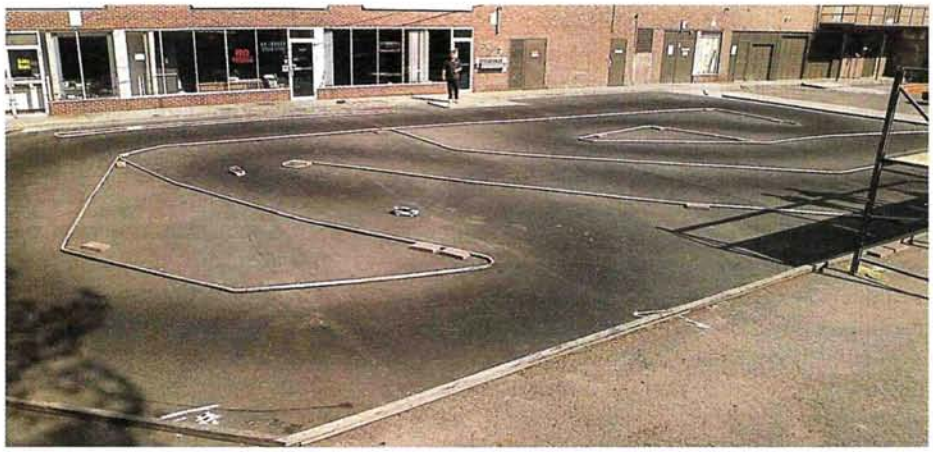
THE COMPETITION

	Drive shafts	Chassis material	Bearing type	Shocks	Pivot ball	Front one-way	Street price**	Reviewed
Associated Factory Team TC3	MIP CVD	Molded graphite	Teflon sealed	Aluminum, threaded	No	No	$319	5/01
Corally C4.1	**Steel UJ***	**Graphite plate**	**Metal shielded**	**Plastic, threaded**	**Yes**	**Yes**	**$539**	**8/01**
HPI RS4 Pro 3	MIP CVD	Molded plastic	Metal shielded	Plastic, threaded	No	No	$219	7/01
Schumacher Axis 2	Plastic UJ*	S1 composite	Metal shielded	Aluminum	No	No	$359	3/01
Yokomo MR-4 TC Worlds	Aluminum UJ*	Molded graphite	Rubber sealed	Aluminum, threaded	No	Yes	$299	4/01

Not all competitive cars are listed; category is too large to list all vehicles. *UJ=Universal joint **Estimated; price varies with dealer.

makes it necessary to take extra time to change the front arms or make any repairs. The upper A-arm sweeps forward and rides on a hinge pin, and small clips are used to adjust the caster. The front graphite shock tower attaches to the bulkhead with two screws. Three mounting holes allow slightly more adjustability. Racers need not worry; a slick transponder mount attaches to the front shock tower. A small rubber cushion protects the transponder if it is jarred.

The rear suspension uses a lower H-arm and adjustable upper link. The lower arm has pivot balls that allow fine adjustments of both toe-in and track, and travel-limiting screws are built into the arms. The arms attach to the rear aluminum bulkhead via hinge pins that are locked into a cross-brace that sets the anti-squat to one of two settings: 0 and 3 degrees. Because the hinge pins are captured between the rear bulkheads, it requires some effort to actually change the anti-squat, but it's nice to have the option. The adjustable upper link is new to the C4.1; it replaces the fixed link of the previous edition. It attaches to the graphite rear shock tower, which has seven mounting locations. The big rear hub carriers are also inherited from the Impulse, and that means they're built for abuse.



RC Madness' asphalt track was the perfect test site for the C4.1.

The shocks are plastic-bodied and feature externally adjustable pistons. Four settings can be selected by rotating the shock shaft. The bodies are threaded for easy preload tuning. Corally white springs are used up front; orange springs are used in the rear.

The C4.1 uses a center-point bellcrank. The steering link is attached to a single center-point bellcrank that rides on bearings. The result is equal throw in each direction. The link has two Ackerman positions for adjusting steering response. The bellcrank is attached to the steering blocks by thick aluminum turnbuckles.

• **Body, wheels and tires.** A body is not included in the kit, so I chose the new Pro-Line Volvo S60 sedan. The S-60 looks great and handles tight technical tracks with ease. The adjustable-height body mounts are a nice feature; they are threaded posts that allow infinite adjustments and make it easy to get a low-riding body.

Corally/Take Off split-spoke 5-star wheels are included. They are very stiff and have virtually no flex during hard cornering. Corally/Take Off slicks wrap around the rims and provide excellent traction. Foam inserts are also included in the kit.

PERFORMANCE

With the one-way set very loose, I took some warm-up laps and familiarized myself with the C4.1 and the track. I initially found the car very easy to drive. A mild on-power push caused me to take some turns a bit too wide, but once I became used to the track, I began to turn faster laps. To get the car to turn in a little better, I dialed in some drag brake, only to find that this caused the rear end to break loose and swing around if I failed to brake when the car was perfectly straight. With the center one-way, all brake action is directed to the rear, and this will cause the rear end to get loose under hard braking. By limiting the amount of maximum brake, I could control the car better.

The C4.1's stock setup hooked up very well on the untreated asphalt track, but I felt it could do better, so I did some minor tuning while I let the motor cool. I tightened the one-way fully to get full-time 4WD. This setup is better for tight tracks like my test track that require lots of heavy braking. With full-time 4WD, I was able to brake without worrying that the rear would come around. The Take Off 22s I used hooked up and showed little sign of wear after six runs, so they stayed on. The car still had a slight push, but with the full-time 4WD, I quickly made it around the track. Greg Vogel was there testing some nitro touring cars, and I easily outpaced him. One of the guys who was watching us rip some laps said to me that he thought the electric car was actually faster than Greg's test vehicles. I just smiled.

With the stock setup—which I thought was slightly too light—I was able to turn some very fast laps quite easily. The mild on-power push was easily compensated for with a quick tap of the brakes. Turn-in was acceptable, but with some mild suspension tweaking, the car could keep a slightly tighter line. On a winding fast track, this would be a decent starting setup, but on a tight track with a lot of stop and go, a slightly thicker oil and heavier spring combo would definitely make the suspension more responsive.

THE VERDICT

The C4.1 is definitely a worthy racecar. The kit includes everything from full graphite to ball-bearing steering. The car is almost endlessly adjustable, thanks in part to the pivot-ball suspension borrowed from its Serpent cousin. The C4.1 is a tad pricey, but you won't need to spend any money tricking it out with anything else, and thanks to its easy and comprehensive adjustability, you should be able to set it up for just about any track. ■

SOURCE GUIDE

CORALLY
Distributed by Specialized RC Intl., 1480 S.R. 436, Casselberry, FL 32707; (407) 681-5906.

KO PROPO USA INC.
16012 South Western Ave., Ste. 308, Gardena, CA 90247; (310) 532-9355; info@kopropo.com; www.kopropo.co.uk.

NOVAK ELECTRONICS INC.
18910 Teller Ave., Irvine, CA 92612; (949) 833-8873; www.teamnovak.com.

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Distributed by Pro-Line, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; www.pro-lineracing.com.

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West Park Center, 2830 NW 79th Ave., Miami, FL 33122; (305) 639-9665; www.hudy.net; info@serpent-usa.com.

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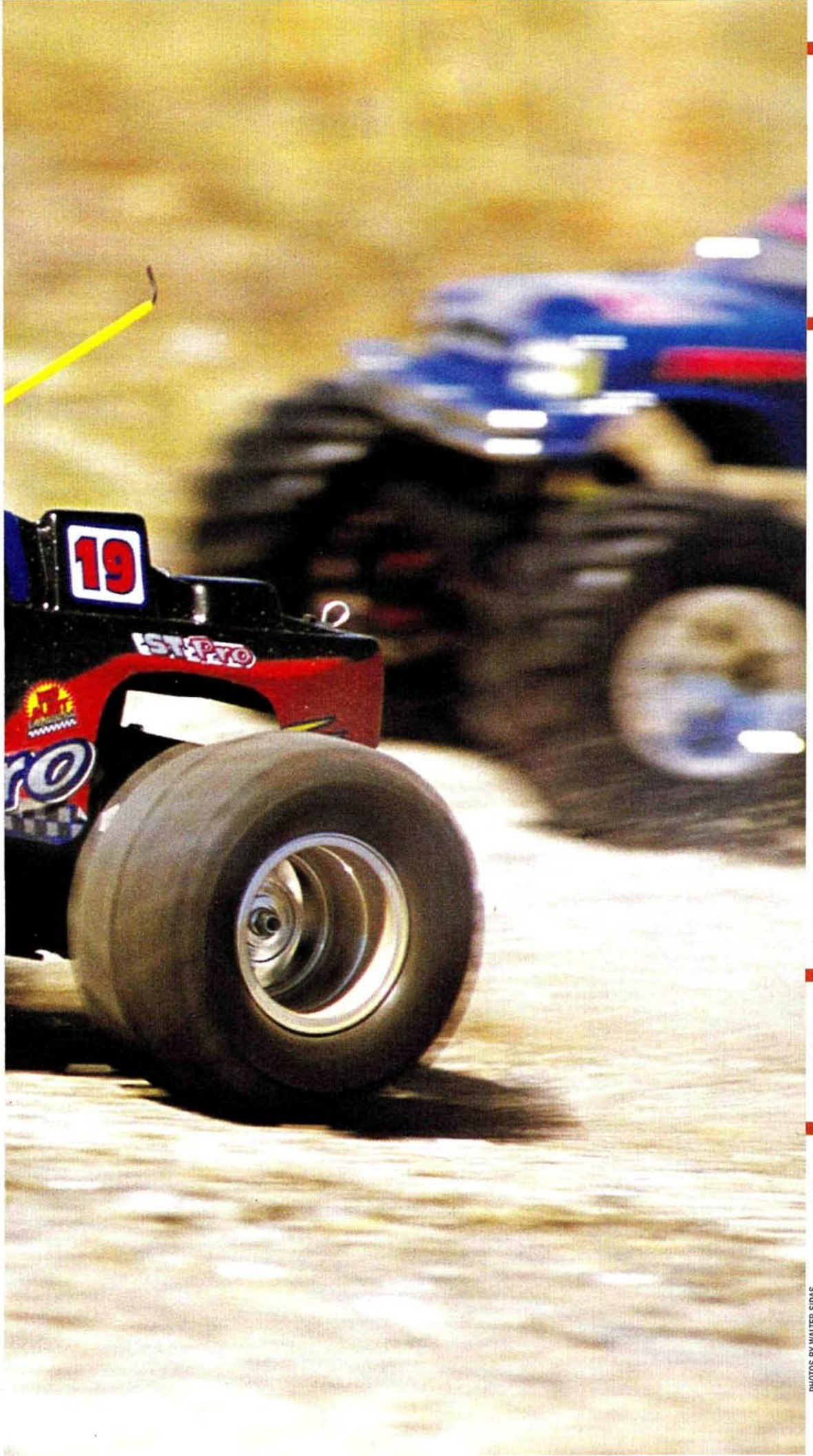
rcpaintman@aol.com.

DuraTrax **Maximum ST & MT Pro**

More speed, more power, more features

by Chris Chianelli

DuraTrax's Maximum ST claimed the number-one spot in our RTR nitro-truck shootout back in the October 1999 issue of *Car Action*, despite the fact that it was equipped with a horrid little expansion-chamber muffler and extension-tube exhaust combo. As many of you know (and for those who don't), I've always recommended against this setup because it robs you of power and causes heat buildup. Well, DuraTrax has not only upgraded the exhaust system to a power-adding and cooler-running tuned system, but it has also added a whole lot of other things and given the Maximum ST a "Pro" suffix. Oh, yes; its turf-banging brother, the Maximum MT, has also been given the Pro treatment and just as much cool hop-up stuff, including oversize 1/8-scale shocks fit for doing overtime monster service. I tested both!



DATA CENTER

VEHICLE TYPE 1/10-scale, .16-powered, 2WD stadium/monster trucks

BEST BUYER Beginners and experts looking for a fast and fun off-road truck

KIT RATINGS (poor, satisfactory, good, very good, excellent)
Instructions Very good
Parts fit/finish Very good
Durability Very good
Overall performance Excellent

SPECIFICATIONS

MANUFACTURER DuraTrax
MODELS Maximum Pro ST and MT
DISTRIBUTED BY Great Planes
SCALE 1/10
STREET PRICE $339.99 (ST), $369.99 (MT)

DIMENSIONS
Wheelbase 262/267mm (10.3/10.5 in.)
Width (F/R) 298/302mm (11.7/11.8 in.)

CHASSIS
Type Tub
Material T6 aluminum

DRIVE TRAIN
Type 2WD gear
Transmission Pinion, idler and spur gears
Drive shafts Steel universal
Differentials Beveled gear
Bearing type Metal-shielded ball bearings

SUSPENSION
Type Lower A-arm/upper turnbuckle
Damping Aluminum, oil-filled coil-over shocks

WHEELS
Type One-piece chrome plastic

TIRES
Type Mounted chevron tread

LIKES

- Totally complete RTR package; just add fuel.
- Very reliable engine.
- Fast!
- Machined-metal parts.
- Full ball bearings, including bellcranks.

DISLIKES

- 2-speed tranny was way out of adjustment.
- Wobbly body posts on MT.
- Chassis mounting screws aren't countersunk.

PHOTOS BY WALTER SIDAS

The trucks are supplied with a fuel bottle, dry-cell-powered glow-plug lighter and 12 AA batteries for the transmitter and onboard pack.

building & setup tips

Both the MT and ST come completely assembled and with all onboard radio gear installed. All you have left to do is apply the decals to the prepainted body, mount the chrome parts on the body, mount the body on the chassis, install the air filter and install the AA batteries. Make sure you check the tightness of all the screws, especially the ones that hold the wheels on. Out of the box, these were loose on two of our test vehicles, and they slipped under acceleration.

Onboard batteries. A 4-cell battery holder is under the small radio plate, which can be removed by unscrewing four screws. I don't recommend the use of rechargeable batteries for these vehicles because the steering servo needs all the torque-producing voltage it can get, and dry-cell alkalines produce more than Ni-Cds do.

Air-filter lube. Before the first break-in runs, lubricate the foam air-filter element with air-filter oil or after-run oil. After three or four tanks of fuel, clean the filter in warm soapy water, and then rinse it thoroughly under running water. After it has dried, relube it and reinstall it.

Engine break-in. This subject is well covered in the instruction booklet. Let me just add that all break-in should be done with the body off, for optimum cooling, and on a hard surface with minimum rolling resistance. Don't rush this step, and you'll be rewarded with a great running truck.

Tank modification. While not a true "miss," I hate those primer pumps put forth as "selling" features and found on too many ready-to-run vehicles. They can easily cause fuel-line bubbles, making a needle setting much more difficult or even impossible to achieve; get rid of these things. To remove this one, pull it out as far as you can—the fatter portion of the rod has to get past the hole, so pull hard—and cut it off. Push the remaining shaft back into the tank and let it fall out through the filler hole. Plug the remaining hole with a self-tapping screw that will fit, and apply silicone sealant.

The rear suspension features upper turnbuckles, aluminum hub carriers and oil-filled shocks. The MT version (shown) has larger, ⅛-scale shocks. Note the steel half shaft with the universal joint on the wheel end.

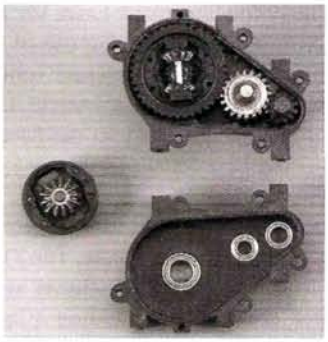
• **Chassis.** The Pro Series uses a tub-style chassis manufactured of anodized 6061 T-6 aluminum (2mm) that supplies more than adequate stiffness for the ST and MT. Tub chassis formed of high-quality aluminum have a long and proven competition record. Remember that years back, Team Associated drivers actually preferred the aluminum-tub chassis and moved away from carbon fiber. When the "Team" car was introduced, it featured an aluminum tub that was, by the way, substantially thinner than the ones found on these DuraTrax trucks (just a bit of history).

The 2mm thick tub-chassis is manufactured form T6 aluminum and more than sufficiently ridged. Mounting holes are not counter-sunk—wish they were. Front kick-up is 27-degrees

Both vehicles have 27 degrees of front-end kick-up and rear braces that run to the top of the gear case. I guess my only gripe about the chassis is that the mounting holes are not countersunk and that protruding round-head screws, vulnerable to being damaged, are used throughout. Not a real biggie, but countersinking would have been nice. The engine-mounting holes are slotted, so I guess gear-ratio options from DuraTrax are in the future, but not presently available, I'm told. The receiver is mounted on a thin (again, 2mm) aluminum upper radio plate that also captures the onboard battery pack with a piece of foam sandwiched between.

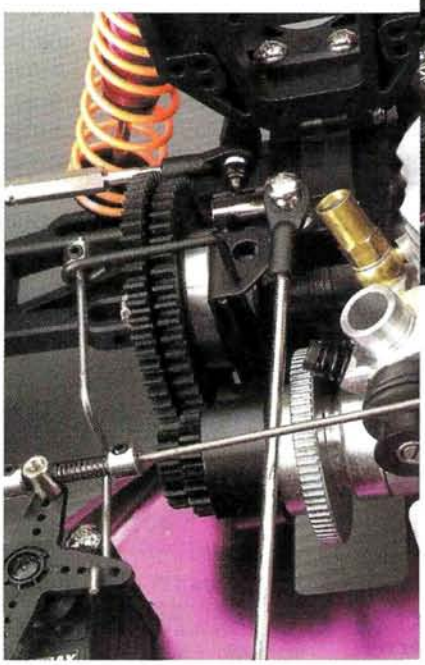
• **Drive train.** Right off the bat, the first thing you notice about the drive train on these two trucks is the 2-speed tranny. Now, I know what you're probably saying: "A 2-speed on an off-road vehicle?" I admit it does sound a bit dubious but, so far, once we had them adjusted correctly, I never had a problem with them jamming because of dirt. Shift points are adjustable, and with the combination of the 2-speed and the tuned-pipe-equipped Torq .16 engine, these Pro Series trucks are fast—very fast.

The tranny looks very durable and consists of: a one-piece metal layshaft/input gear unit; metal idler gear and composite differential ring gear, with all internal differential beveled gears being metal. Gear thickness throughout is 9mm, and all are supported by ball bearings on both ends. As I said, things look quite robust inside this diff case. The 2-speed ratios are: first gear—3.47:1; second gear—2.53:1; final drive for the gearbox—3.25:1. Metal half shafts use output-cup/dogbone drives inboard and universals outboard. The U-joints are of very good quality and exhibit almost no play. Power is transferred from the Torq .16 to the drive train via a 3-shoe composite clutch.

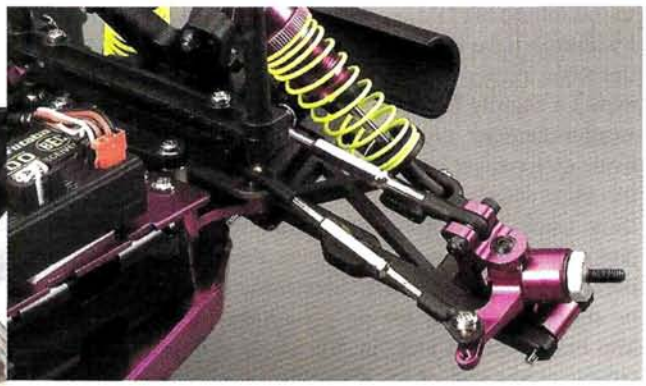


The full-ball-bearing gearbox features a metal pinion/layshaft and idler gear and a composite differential spur gear, all of which are 9mm wide. Internal differential beveled spider and output shaft gears are also metal. This gearbox and diff look quite tough.

• **Suspension and steering.** The lower A-arms and other chassis components are made of what DuraTrax calls "StressTech" plastic. This stuff is pretty rugged and even survived when a radar speed run that went "awry"—that is ... I mean, that went "a-right"—into a concrete aqueduct. Steve Pond was driving—not me; OK? The impact bent a hinge pin and pulled it out of the arm mount, but nothing broke. Steel turnbuckles make camber adjustments easy, and all hub carriers and steering blocks are made of anodized aluminum. Inner and outer axle ball bearings are found on both trucks. I'd like to point out that DuraTrax did not just add big wheels to the ST and then call it the MT. Not only are larger, ⅛-scale-style- shocks found on the MT, but its A-arms are also ⅝ inch longer than the ST's. Both trucks use threaded aluminum shock bodies for easy preload adjustment via knurled collars.



Brake, throttle and 2-speed tranny: all were easy to get to for adjustments



The front suspension features aluminum steering hubs, hub carriers, bellcranks and idler arm. Plated-steel turnbuckles with wide flats make camber adjustments simple.

• **Engine and accessories.** Both trucks include DuraTrax's pull-start Torq .16 engine. The engine features a rotary carburetor with low- and high-end needles as well

INCLUDED TEST GEAR

DuraTrax transmitter and receiver

The DuraTrax radio and receiver, which could easily be used in any other vehicle in the future, are manufactured by Futaba and fall very much into the "sport" class of radio. It's AM and features throttle and steering trim and reversing plus a charging port if Ni-Cd batteries are ever installed. The receiver does feature BEC circuitry but, obviously, these being nitro-powered vehicles, a dedicated onboard battery pack is used.

DuraTrax/Futaba FX-100 servos

These servos were fine for throttle and braking on both trucks and OK for steering function on the ST but were somewhat lacking in the torque department for the MT.

ADDITIONAL TEST GEAR

not included

O'Donnell 20-percent-nitro fuel

When a fuel gives me good results, I stick with it, and that's why I chose O'Donnell fuel for the Maximum Pro trucks. I've never had a problem with the stuff, and I think it's worth paying a little more for it rather than getting the cheap stuff.

as true ABS construction and a machined heat-sink head. My biggest dislike about the original Maximum series was the use of a little expansion-chamber can muffler and skinny exhaust tube. This combination robs you of power and causes heat—yuck! The Pro Series adds the header and tuned-pipe system you see here—hallelujah! That spells more power with cooler running.

• **Body, wheels and tires.** DuraTrax includes factory-finished bodies with all the Maximum trucks, "regular" and Pro alike. The ST wears a sleek racing-style body while the MT model includes separate, injection-molded, chrome-plated detail parts including a light bar and bumpers. The MT body does the "shimmy" when the truck is being run; I'd like to see better-supported body posts.

As for the rolling stock, both Pros include chrome, 2.2-inch wheels with chevron tires, but the MT's rubber is noticeably larger for a true monster stance.

PERFORMANCE

Nothing can ruin the enjoyment of a nitro-powered vehicle faster than a cranky engine. The Torq .16 may be the most reliable engine to have ever been put in a ready-to-run vehicle. We had three Maximum vehicles come through our office, and every engine started up right away and kept running. I even ran the engine with a ridiculously rich high-end needle setting—slow and sloppy, as the expression goes—with no battery connected to the glow plug. Even then, the engine idled and accelerated from idle without stalling. This is a testament to the excellent design of the twin-needle carburetor.

Remember I said these trucks were fast? Well, how does 43mph sound for the MT? I'd say 43mph for a monster truck is smokin', and I wouldn't have believed it myself if I wasn't behind the wheel for the radar testing. Since both trucks have the same gearing, you can expect a slightly lower top speed from the ST because of its slightly smaller-diameter tires. Because of these smaller tires, which effectively give a lower ratio and better acceleration, we got the ST to pull the front wheels a few times when it shifted into second gear. I like these trucks. Suspension travel and shock action are very smooth and made both easy to drive. Like almost any other 2WD vehicle, both understeer under hard acceleration, and turning tightly has to be coordinated with the proper application of throttle and brake. The brake worked well, by the way—well enough to lock up the wheels at the end of the speed runs but not well enough for daydreamer Steve to avoid the wall.

I do have one steering dislike: I found the stock steering servo a bit on the limp side for the large-wheel MT version. The tires on the MT are in the standard monster-truck, chevron-tread style and work exactly as you'd expect. On the other hand, I found the tire choice for the ST a bit perplexing. The tires are a smaller version of monster-truck, chevron-type tread designs—the same as are found on the original, non-Pro Maximum. I find this DuraTrax choice curious; why did it put all these great options on the Pro ST and then stop short at the tires? We know how huge a difference tires can make. It's kind of like ordering a hot Corvette with all the options and then asking the dealer to supply it with temporary spares on all four corners. Though not on a par with an all-out race truck, I think the ST Pro is far more capable than its chevron tires.

Left: the tuned exhaust system on the Max Pro truck is a huge improvement on the "can"-style expansion muffler and extension tube found on the orginal Maximum.

Right: the twin-needle carburetor on the Torq .16 has excellent fuel-metering characteristics, giving the engine both excellent idle and throttle response.

The Torq .16, with its very good carb, really helps out a lot when you're driving. The good idle and very good throttle response really make the Pro trucks respond well in the turns and short straights. This carb is so good that it even had a reliable idle and decent throttle response when I tried to get it too quiet with a super-rich, sloppy, high-end needle setting. This carb kept the engine going and going and going. DuraTrax—kind of like Duracell in this respect.

THE VERDICT

It's obvious that DuraTrax has put a lot of time and effort into the development of these ready-to-run trucks. Moreover, I think they offer a whole lot of value, considering all the stuff that's loaded onto them—from the smoothly functioning anodized shocks to the close-tolerance steel universal drives. But the first and best reason I recommend these trucks to you is the engine. In general, the engine has never really been the big selling point with ready-to-run nitro vehicles; it is now. We had three samples of the DuraTrax trucks—two MTs and one ST—and right out of the box, the engine on every one started and kept running. I think most would agree that in this nitro game, that's a most important feature.

The MT will bang and bash with the best of them, and given enough runway, will out-drag them all in a straight run. With some off-road, stadium-truck front and rear tires mounted on the ST, you may do better than you expect at your local track. You might not beat the hottest Associated and Losi trucks out there, but if you're a smooth, practiced driver who stays on the track and out of the woods, maybe you will. One competition fact is for certain, in my humble opinion: the DuraTrax ST Pro and MT Pro are top competitors in the nitro-powered, ready-to-run truck market. ■

SOURCE GUIDE

DURATRAX
Distributed by Great Planes.

FUTABA
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GREAT PLANES MODEL DISTRIBUTORS
2904 Research Rd., P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948.

O'DONNELL RACING
10702 Hathaway Dr., # 2, Santa Fe Springs, CA 90670; (562) 944-9671.

2001 .12 ENG

How many different types of .12 engine would you guess are available these days? Would you guess over 70? After we had done the research for this guide, even we were surprised at the number of options available. As daunting as that figure may seem, understanding the differences between engines is not that hard, as each manufacturer tends to build a number of engines on the same block with carburetor type, heat-sink-head style and starting method being the real differences. To help you make an informed engine choice, we've compiled information on the most popular .12 engines, listed them alphabetically by brand and added some sidebars to help you understand all the tech stuff. From pull-start sport powerplants to full-on racing jobs, your next engine is here.

DURATRAX

TORQ .12

DuraTrax packed a lot of features into its Torq .12, including a large, machined-aluminum, heat-sink head, front and rear bearings and an O-ring-sealed carb. It is available with a rotary-style carb and a pull-starter—a quality replacement for your stock .12 engine. **DuraTrax, distributed by Great Planes Model Distributors, 2904 Research Rd., P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; www.duratrax.com.**

AT A GLANCE

Claimed horsepower (hp).....0.46
Rpm 29,000
Carb .....Rotary
Crank .....Standard
Construction .....ABC
Pull-start available? .....Yes

DYNAMITE

12S & 12SPD

Dynamite engines offer a large aluminum, heat sink head, a rotary carb, both short and standard crank lengths and pull-start or non-pull-start. With its unique, dished piston that is claimed to increase horsepower, the 12SPD is clearly targeted at racers. **Dynamite; distributed by Horizon Hobby Inc., 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.**

AT A GLANCE

Claimed hp 0.50
Rpm 30,000
Carb .....Rotary
Crank.....Standard, short
Construction .....ABC
Pull-start available? .....Yes

MANUFACTURERS' SPECIFICATIONS

Manufacturer	Part no.	Carb	Adjustments	Heat-sink head	Exhaust	Piston sleeve	Ports
DURATRAX							
Torq .12	DTXG0200	Rotary	2-needle	Round	Side	ABC	3
DYNAMITE							
.12S PS	DYN6500	Rotary	2-needle	Round	Side	ABC	3
.12S PS	DYN6501	Rotary	2-needle	Round	Side	ABC	3
.12SPD PS	DYN6505	Rotary	2-needle	Round	Side	ABC	3
.12SPD PS	DYN6506	Rotary	2-needle	Round	Side	ABC	3
.12SPD	DYN6507	Rotary	2-needle	Round	Side	ABC	3
.12SPD	DYN6508	Rotary	2-needle	Round	Side	ABC	3
HPI							
12R SC EVO II	1906	Slide	3-needle	Round	Side	ABC	3
12R SC EVO II PS	1909	Rotary	2-needle	Round	Side	ABC	3
MUGEN							
MT12	MT12SG/S	Slide	3-needle	Round	Rear	ABC	3
MT12 (turbo head)	MT12T/S	Slide	3-needle	Round	Rear	ABC	3
MT12	MT12S/R	Rotary	2-needle	Round	Rear	ABC	3
NOVAROSSI							
CX 12S	CX12S	Slide	3-needle	Round	Side	ABC	3
CX 12R	CX12R	Rotary	2-needle	Round	Side	ABC	3
CX 12S (PS)	CX12SPS	Slide	3-needle	Round	Side	ABC	3
CX 12R (PS)	CX12RPS	Rotary	2-needle	Round	Side	ABC	3
RS 12	RS12	Slide	3-needle	Round	Rear	ABC	3
RS 12T (turbo plug)	RS12T	Slide	3-needle	Round	Rear	ABC	3

INE GUIDE

BY DEREK BUONO

FROM DURATRAX TO YOKOMO—MORE THAN 70 CHOICES!

HPI

12R SC EVO II

The EVO II is HPI's latest engine, and since it's made by the Novarossi horsepower gurus, it packs class-leading power. Its features include a side exhaust, a large heat-sink head and a choice of slide or rotary-style carb, and pull-start or non-pull-start. Their ABC construction ensure the piston and sleeve will endure hours of running. This is a racing engine, so it does require extra patience and above average tuning knowledge, but the payoffs are tons of speed and torque. **HPI Racing, 15321 Barranca Pky., Irvine, CA 92618; (949) 753-1099; www.hpiracing.com.**

AT A GLANCE

Claimed hp 1.25
Rpm 36,000
Carb.....Rotary, slide
Crank .....Standard, short
Construction.....ABC
Pull-start available? .....Yes

MUGEN

MT12

The MT12 is Novarossi-based engine that just screams performance. Its large heat-sink head, ABC construction and slide- or rotary-style carb make the MT12 a versatile powerplant. For maximum power, it's available with a turbo plug head. A choice of standard or SG-style crank ensures a perfect fit in most vehicles. **Mugen USA, 20914 Blake Pky., Ste. 106, Lake Forest, CA 92630; (949) 707-5607; www.mugenracing.com.**

AT A GLANCE

Claimed hp 1.15
Rpm 36,500
Carb .....Rotary, slide
Crank .....Standard, SG
Construction .....ABC
Pull-start available? .....No

NOVAROSSI

CX12

The CX12's main attribute is its high horsepower, and it's available in a variety of configurations to suit most applications: slide or rotary carb; pull-start or non-pull-start. The pilot shaft makes clutch installation easy. **Novarossi; distributed by Paris Racing, 4254 Independence St., Chino, CA 91710; (909) 465-1189; www.parisracing.com.**

AT A GLANCE

Claimed hp 1.0
Rpm 35,000
Carb .....Rotary, slide
Crank .....Standard
Construction .....ABC
Pull-start available? .....Yes

Shaft	Starter	Rpm	Claimed hp	Bore (in./mm)	Stroke (in./mm)	Displacement	Weight (oz./grams)	Street price
Std.	Recoil	29,000	0.46	0.55/14	0.54/13.7	0.129ci (2.2cc)	8.5/241	$95
Std.	Recoil	30,000	0.50	0.55/14	0.54/13.7	0.129ci (2.2cc)	9.0/257	$70
Short	Recoil	30,000	0.50	0.55/14	0.54/13.7	0.129ci (2.2cc)	9.0/257	$70
Std.	Recoil	30,000	0.50	0.55/14	0.54/13.7	0.129ci (2.2cc)	9.0/257	$85
Std.	Recoil	30,000	0.50	0.55/14	0.54/13.7	0.129ci (2.2cc)	9.0/257	$85
Std.	Bump	30,000	0.50	0.55/14	0.54/13.7	0.129ci (2.2cc)	7.1/200	$80
Short	Bump	30,000	0.50	0.55/14	0.54/13.7	0.129ci (2.2cc)	7.1/200	$80
Std.	Bump	36,000	1.25	0.55/13.8	0.56/14	0.128ci (2.1cc)	7.4/210	$169
Std.	Recoil	36,000	1.25	0.55/13.8	0.56/14	0.128ci (2.1cc)	8.8/250	$189
SG	Bump	36,500	1.15	0.54/13.8	0.55/14	0.128ci (2.1cc)	7.6/215	$199
SG	Bump	36,500	1.15	0.54/13.8	0.55/14	0.128ci (2.1cc)	7.6/215	$219
Std.	Bump	36,500	1.15	0.54/13.8	0.55/14	0.128ci (2.1cc)	7.6/215	$199
Std.	Bump	35,000	1.00	0.55/14	0.54/13.8	0.128ci (2.1cc)	7.4/210	$159
Std.	Bump	35,000	1.00	0.55/14	0.54/13.8	0.128ci (2.1cc)	7.4/210	$159
Std.	Recoil	35,000	1.00	0.55/14	0.54/13.8	0.128ci (2.1cc)	9.2/260	$189
Std.	Recoil	35,000	1.00	0.55/14	0.54/13.8	0.128ci (2.1cc)	9.2/260	$189
Std.	Bump	36,000	1.35	0.55/13.8	0.56/14	0.128ci (2.1cc)	7.4/210	$199
Std.	Bump	37,000	1.35	0.55/13.8	0.56/14	0.128ci (2.1cc)	7.4/210	$189

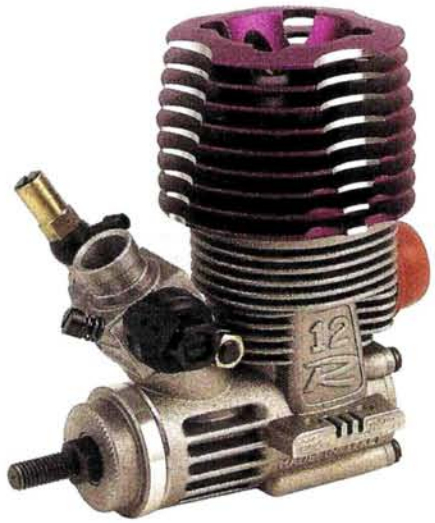
NOVAROSSI

RS12 & RS12T

This engine has the highest claimed horsepower output—a staggering 1.35hp. It has a rear exhaust, so check to see if your vehicle was designed to accommodate this type of engine. The RS12T has a turbo plug that is also claimed to boost its power. Like all Novarossi engines, the RT12T's ABC construction ensures that it will handle hours of abuse. A pilot shaft is the only crank available with this engine.

AT A GLANCE

Claimed hp 1.35
Rpm 36,000
Carb .....Slide
Crank .....Standard
Construction .....ABC
Pull-start available? .....No



NOVA MEGA

SX-12SE & SX-12RE

Serpent puts its stamp of approval on the Novarossi mill. It has the usual high-performance features—ABC construction, slide carb, standard- or SG-style crank and large aluminum heat-sink head. The rear-exhaust (RE) model comes in two versions: turbo- and non-turbo-style head. The SX-12RE is available only with an SG-style crank. **Nova Mega; distributed by Serpent Inc. USA, West Park Center, 2830 NW 79th Ave., Miami, FL 33122; (305) 639-9665; www.hudy.net.**

AT A GLANCE

Claimed hp 1.15
Rpm 36,500
Carb .....Slide
Crank .....Standard, SG
Construction .....ABC
Pull-start available? .....Yes

OFNA

FORCE 12S

The pull-start Force engines are good replacements for your stock engine. With their standard-length cranks, they can be dropped into most cars in just a few minutes. **OFNA, 22600 Lambert, Ste., D-1009, Lake Forest, CA 92630; (714) 586-2910; www.ofna.com.**

AT A GLANCE

Claimed hp 0.50
Rpm 29,000
Carb .....Rotary
Crank .....Standard
Construction .....ABC
Pull-start available? .....Yes

MANUFACTURERS' SPECIFICATIONS

Manufacturer	Part no.	Carb	Adjustments	Heat-sink head	Exhaust	Piston sleeve	Ports
NOVA MEGA							
SX-12SE EV-1	2100	Slide	3-needle	Round	Side	ABC	3
SX-12SE EV-2	2101	Slide	3-needle	Round	Side	ABC	3
SX-12RE EV-1	2103	Slide	3-needle	Round	Rear	ABC	3
SX-12RE EV-1 (turbo)	2103MS	Slide	3-needle	Round	Rear	ABC	3
OFNA							
Force 12S Red Head	50121	Rotary	2-needle	Round	Side	ABC	3
Factory 12 Pro	50124	Rotary	2-needle	Round	Side	ABC	3
Factory 12 Pro (PS)	50125	Rotary	2-needle	Round	Side	ABC	3
O.S. ENGINES							
CV	OSMG2010	Rotary (10E)	2-needle	Block	Side	ABN	3
CV (S)	OSMG2015	Rotary (10E)	2-needle	Block	Side	ABN	3
CV-X	OSMG2011	Rotary (10E)	2-needle	Block	Side	ABN	3
CV-X (S)	OSMG2013	Rotary (10E)	2-needle	Block	Side	ABN	3
CV Hyper	OSMG2025	Rotary (10E)	2-needle	Round	Side	ABN	3
CV Hyper	OSMG2023	Rotary (10A)	2-needle	Round	Side	ABN	3
CV-X Hyper	OSMG2026	Rotary (10E)	2-needle	Round	Side	ABN	3
CV-X Hyper	OSMG2024	Rotary (10A)	2-needle	Round	Side	ABN	3
LD	OSMG2020	Slide (10F)	2-needle	Cast	Side	ABN	3
LD-X	OSMG2021	Slide (10F)	2-needle	Cast	Side	ABN	3
CV-R	OSMG2045	Rotary (10ER)	2-needle	Round	Side	ABC	3
CV-RX	OSMG2048	Rotary (10ER)	2-needle	Round	Side	ABC	3
CV-R	OSMG2046	Slide (10A)	2-needle	Round	Side	ABC	3
CV-RX	OSMG2049	Slide (10A)	2-needle	Round	Side	ABC	3
CV-R (S)	OSMG2047	Rotary (10ER)	2-needle	Round	Side	ABC	3
CV-RX (S)	OSMG2050	Rotary (10ER)	2-needle	Round	Side	ABC	3

OFNA

FACTORY .12 PRO

This is OFNA's most powerful .12; it churns out slightly more power than the Force 12S and is suitable for the track. Features include: rotary carb, a boost bottle (which is claimed to give a better low-end throttle response) and a choice of pull-start and non-pull-start versions.

AT A GLANCE

Claimed hp 0.67
Rpm 30,000
Carb .....Rotary
Crank .....Standard
Construction .....ABC
Pull-start available? .....Yes

O.S. ENGINES

CV

The CV design has been around for a long time, and it's proved itself a powerful, reliable and popular unit for beginners and experienced racers; in fact, it's a three-time "Readers' Choice" winner in its category. The CV and CV-Hyper engines share ABN construction and horsepower rating and offer a choice of carbs. The Hyper engines have a round, machined-aluminum heat-sink head that enhances cooling. **O.S. Engines distributed by Great Planes Model Distributors, 2904 Research Rd., P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; www.osengines.com.**

AT A GLANCE

Claimed hp 0.56
Rpm 30,000
Carb .....Rotary, slide
Crank.....Standard, short
Construction .....ABN
Pull-start available? .....Yes

CV-R

Racers and speed freaks will really go for the CV-R series; these engines step up the power, have durable chrome plating in the piston and sleeve and ABC construction. They also offer a choice of a slide- or rotary-style carb, a large aluminum heat sink and, of course, O.S. reliability.

AT A GLANCE

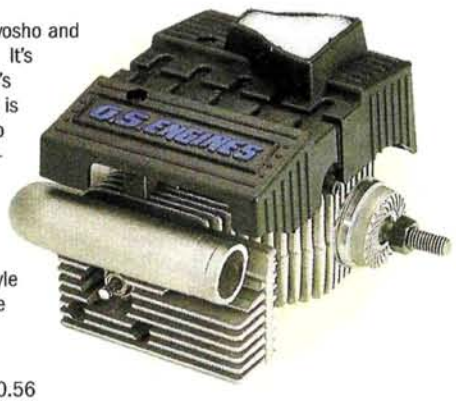
Claimed hp 1
Rpm 32,000
Carb .....Rotary, slide
Crank.....Standard, short
Construction .....ABC
Pull-start available? .....Yes

Shaft	Starter	Rpm	Claimed hp	Bore (in./mm)	Stroke (in./mm)	Displacement	Weight (oz./grams)	Street price
Std.	Bump	35,000	1.00	0.55/14	0.54/13.8	0.128ci (2.1cc)	7.4/210	$165
Std.	Bump	36,000	1.25	0.55/13.8	0.56/14	0.128ci (2.1cc)	7.4/210	$185
SG	Bump	36,500	1.15	0.54/13.8	0.55/14	0.128ci (2.1cc)	7.6/215	$185
SG	Bump	36,500	1.15	0.54/13.8	0.55/14	0.128ci (2.1cc)	7.6/215	$229
Std.	Recoil	29,000	0.50	0.55/13.9	0.54/13.7	0.128ci (2.1cc)	7.4/210	$79
Std.	Bump	30,000	0.67	0.55/13.9	0.54/13.7	0.128ci (2.1cc)	6.4/180	$125
Std.	Recoil	30,000	0.67	0.55/13.9	0.54/13.7	0.128ci (2.1cc)	7.4/210	$135
Std.	Bump	30,000	0.56	0.55/14	0.54/13.7	0.129ci (2.2cc)	8.1/230	$105
Short	Bump	30,000	0.56	0.55/14	0.54/13.7	0.129ci (2.2cc)	8.1/230	$103
Std.	Recoil	30,000	0.56	0.55/14	0.54/13.7	0.129ci (2.2cc)	10.2/284	$135
Short	Recoil	30,000	0.56	0.55/14	0.54/13.7	0.129ci (2.2cc)	10.2/284	$135
Std.	Bump	30,000	0.56	0.55/14	0.54/13.7	0.129ci (2.2cc)	6.9/196	$127
Std.	Bump	30,000	0.56	0.55/14	0.54/13.7	0.129ci (2.2cc)	6.9/196	$135
Std.	Recoil	30,000	0.56	0.55/14	0.54/13.7	0.129ci (2.2cc)	9.0/255	$145
Std.	Recoil	30,000	0.56	0.55/14	0.54/13.7	0.129ci (2.2cc)	9.0/255	$159
Std.	Bump	30,000	0.56	0.55/14	0.54/13.7	0.129ci (2.2cc)	9.6/270	$189
Std.	Recoil	30,000	0.56	0.55/14	0.54/13.7	0.129ci (2.2cc)	11.9/330	$219
Std.	Bump	32,000	1.00	0.55/14	0.54/13.7	0.129ci (2.2cc)	7.1/200	$169
Std.	Recoil	32,000	1.00	0.55/14	0.54/13.7	0.129ci (2.2cc)	9.1/258	$199
Std.	Recoil	32,000	1.00	0.55/14	0.54/13.7	0.129ci (2.2cc)	7.1/200	$149
Std.	Recoil	32,000	1.00	0.55/14	0.54/13.7	0.129ci (2.2cc)	9.1/258	$209
Short	Bump	32,000	1.00	0.55/14	0.54/13.7	0.129ci (2.2cc)	7.1/200	$169
Short	Recoil	32,000	1.00	0.55/14	0.54/13.7	0.129ci (2.2cc)	9.1/258	$199

O.S. ENGINES

LD

The LD is a special engine for Kyosho and Tamiya shaft-driven touring cars. It's designed to help lower a vehicle's overall center of gravity. Missing is a large vertical heat-sink head to dissipate heat, but O.S. compensates for this with a redesigned block that has a larger surface area. The low-slung LD series engines have ABN construction and a slide-style carb, and they produce the same power as the other CV engines.



AT A GLANCE

Claimed hp 0.56
RPM 30,000
Carb .....Slide
Crank.....Standard, short
Construction .....ABN
Pull-start available? .....Yes

REX

CR12

The CR12 is a Novarossi engine wearing a different shirt but with the usual high-performance components inside: ABC construction, slide or rotary-style carb and a large heat-sink head are just some of its features. **Rex; distributed by Mugen USA, 20914 Blake Pky., Ste. 106, Lake Forest, CA 92630; (949) 707-5607; www.mugenracing.com.**

AT A GLANCE

Claimed hp 1.0
Rpm 35,000
Carb .....Rotary, slide
Crank .....Standard
Construction .....ABC
Pull-start available? .....Yes

Dyno-mite! Dyno testing

We've listed the manufacturers' claimed horsepower numbers for the engines in this guide, but the most accurate way to determine an engine's true horsepower is to run it on a dynamometer—"dyno" for short. *Radio Control Nitro*, *RC Car Action*'s all-nitro sister magazine, uses a custom-made dyno that was built just for testing RC engines. Land and Sea, dyno-makers for full-scale racers of everything from go-karts and snowmobiles to top-fuel dragsters and stock cars, built the *RC Nitro* dyno. It's the real thing, and you'll find a new engine dyno test in each issue. *RC Nitro* also supplies data for *RC Car Action* engine reviews—see the XTM Racing .15 test in this issue.

THUNDER TIGER

PRO-12BZ

For a long time, Thunder Tiger has made high-quality engines with nothing less than ABC construction, a rotary carb and a large heat-sink head. Each version is available with or without a pull-starter and with short or pilot-style crankshafts. **Thunder Tiger; distributed by Ace Hobby Distributors Inc., 116 W. 19th St., Higginsville, MO 64037-0472; (660) 584-7121; www.acehobby.com.**

AT A GLANCE

Claimed hp 0.50
Rpm 30,000
Carb .....Rotary
Crank .....Standard, short, SG
Construction .....ABC
Pull-start available? .....Yes

MANUFACTURERS' SPECIFICATIONS

Manufacturer	Part no.	Carb	Adjustments	Heat-sink head	Exhaust	Piston sleeve	Ports
REX							
CR 12S	CR12S	Slide	3-needle	Round	Side	ABC	3
CR 12R	CR12R	Rotary	2-needle	Round	Side	ABC	3
TRINITY/PICCO							
P12 Speed Picco exhaust	TP090	Rotary	2-needle	Round	Side	ABC	3
P12 Speed Picco exhaust (PS)	TP091	Rotary	2-needle	Round	Side	ABC	3
P12 Speed	TP095	Rotary	2-needle	Round	Side	ABC	3
P12 Speed (PS)	TP096	Rotary	2-needle	Round	Side	ABC	3
P12 RE	TP100	Rotary	2-needle	Round	Rear	ABC	3
P12 RE	TP101	Slide	2-needle	Round	Rear	ABC	3
THUNDER TIGER							
Pro-12BZ (AP)	TTR9408	Rotary	2-needle	Round	Side	ABC	3
Pro-12BZ (AP) (PS)	TTR9409	Rotary	2-needle	Round	Side	ABC	3
Pro-12BZ(P) Pro	TTR9431	Rotary	2-needle	Round	Side	ABC	3
Pro-12BZ(P) Pro (PS)	TTR9433	Rotary	2-needle	Round	Side	ABC	3
EVO-12	TTR9460	Rotary	2-needle	Round	Side	ABC	3
EVO-12(TH)	TTR9464	Rotary	2-needle	Round	Side	ABC	3
EVO-12X	TTR9461	Rotary	2-needle	Round	Side	ABC	3
EVO-12X(TH)	TTR9465	Rotary	2-needle	Round	Side	ABC	3
YOKOMO							
RX-12 Hyper S	ZE-R12	Slide	2-needle	Round	Side	ABC	3

Std. = standard; RE = rear exhaust; ABC = aluminum/brass/chrome piston and sleeve construction; ABN = aluminum/brass/nickel construction

Why a .12 is a .12

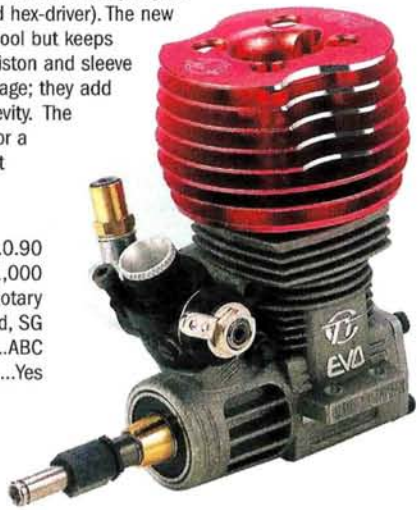
A lot of hobbyists believe that an engine's "size"—.12, .15, .21, etc.—is a reference to its piston's diameter. Though piston diameter does vary with engine size (or displacement, to use the correct term) engine displacement is not determined solely by the piston's diameter. "Displacement" refers to the volume of the combustion chamber, and that is determined by the cylinder's diameter, or bore, and how far the piston travels in the cylinder—its stroke. For example, the bore of an O.S. CV is 14mm, and its stroke is 13.7mm. If we plug these numbers into the formula to find the cylinder volume (volume = pi x radius^2 x height), we get 2.1cc; convert that to cubic inches (ci), and you get 0.128. That's actually a little larger than .12ci, but it isn't .13, so the O.S. CV is indeed a "12."

It's important to note that one engine may have a large-diameter piston with a short stroke while another may have a small-diameter piston and a long stroke, and both will displace .12 cubic inch. Conventional engine wisdom says that long-stroke engines produce more torque but lower rpm while short-stroke engines rev faster but have less torque. In the .12 engine category, bore and stroke measurements don't vary significantly enough to be a factor; according to manufacturers' specs, the longest stroke among the engines featured in this guide is 14mm and the shortest is 13.7mm.

THUNDER TIGER

EVO-12R

The newest in Thunder Tiger's line, the EVO-12R is packed with features. Bolted to the engine case is a new composite carb that sports a removable venturi and easy-to-adjust hex-head needle valves for easy adjustments (you just need a ball-end hex-driver). The new heat-sink head not only looks cool but keeps the engine cool, too. The ABC piston and sleeve are actually an OEM Nova package; they add to the engine's power and longevity. The engine is available with an SG or a standard-length crankshaft to fit most applications.



AT A GLANCE

Claimed hp 0.90
Rpm 31,000
Carb .....Rotary
Crank .....Standard, SG
Construction .....ABC
Pull-start available? .....Yes

TRINITY/PICCO

P12 SPEED

The P12 has Picco engine technology and performance; it offers ABC construction and a rotary-style carb and is available in pull-start and non-pull-start versions. The P12 is offered with a Picco exhaust or a standard one: the Picco exhaust uses a round exhaust port on the side of the engine while the standard exhaust uses the standard rectangular exhaust port. **Picco; distributed by Trinity Products Inc., 36 Meridian Rd., Edison, NJ 08820; (732) 635-1600; www.teamtrinity.com.**

AT A GLANCE

Claimed hp 1.15
Rpm 34,000
Carb .....Rotary
Crank .....Standard
Construction .....ABC
Pull-start available? .....Yes

Shaft	Starter	Rpm	Claimed hp	Bore (in./mm)	Stroke (in./mm)	Displacement	Weight (oz./grams)	Street price
Std.	Bump	35,000	1.00	0.55/14	0.54/13.8	0.128ci (2.1cc)	7.4/210	$189
Std.	Bump	35,000	1.00	0.55/14	0.54/13.8	0.128ci (2.1cc)	7.4/210	$189
Std.	Bump	34,000	1.15	0.54/13.8	0.55/14	0.128ci (2.1cc)	7.1/201	$155
Std.	Recoil	34,000	1.15	0.54/13.8	0.55/14	0.128ci (2.1cc)	7.6/215	$189
Std.	Bump	34,000	1.15	0.54/13.8	0.55/14	0.128ci (2.1cc)	7.1/201	$155
Std.	Recoil	34,000	1.15	0.54/13.8	0.55/14	0.128ci (2.1cc)	7.6/215	$189
Std.	Bump	36,000	1.25	0.54/13.8	0.55/14	0.128ci (2.1cc)	7.6/215	$189
Std.	Bump	36,000	1.25	0.54/13.8	0.55/14	0.128ci (2.1cc)	7.6/215	$189
Short	Bump	30,000	0.56	0.55/14	0.54/13.7	0.128ci (2.1cc)	5.9/168	$89
Short	Recoil	30,000	0.56	0.55/14	0.54/13.7	0.128ci (2.1cc)	7.4/210	$109
Short	Bump	30,000	0.56	0.55/14	0.54/13.7	0.128ci (2.1cc)	5.9/168	$89
Short	Recoil	30,000	0.56	0.55/14	0.54/13.7	0.128ci (2.1cc)	7.4/210	$109
SG	Bump	31,000	1.00	0.55/13.9	0.55/14	0.129ci (2.1cc)	6.4/180	$120
Std.	Bump	31,000	1.00	0.55/13.9	0.55/14	0.129ci (2.1cc)	6.4/180	$120
SG	Recoil	31,000	0.90	0.55/13.9	0.55/14	0.129ci (2.1cc)	8.1/230	$135
Std.	Recoil	31,000	0.90	0.55/13.9	0.55/14	0.129ci (2.1cc)	8.1/230	$135
SG	Bump	32,000	0.85	0.55/14	0.54/13.8	0.128ci (2.1cc)	6.7/190	$100

GLOSSARY OF TERMS

1. GLOW PLUG
The glow plug includes a heating element that helps to start the engine. Once the engine is running, the element's heat ignites the fuel and keeps the engine running. Glow plugs with a range of element temperatures are available to suit a variety of applications and weather conditions.

2. CYLINDER HEAD
For air-cooled nitro engines, the cylinder head is the primary source of cooling air. Smaller heads are more suited to on-road racing in which the cars run at higher speeds; slower off-road vehicles require larger heads.

3. HEAD INSERT
Many high-performance engines have a separate head insert for more flexibility when fine-tuning. Two-piece heads are also less costly to replace if the threads for the glow plug are stripped.

4. HEAD SHIM/GASKET
Head shims allow the piston/head clearance to be modified, and that, in turn, changes the compression ratio. When running high-nitro fuels, extra shims are useful; at least one is needed as a gasket to seal the joint between the cylinder head and the piston sleeve.

5. PISTON
The piston travels up and down at up to 600 times a second. As it travels upward, it compresses the air/fuel mixture for combustion. When the mixture is ignited, it creates the pressure that forces the piston downward.

6. CONNECTING ROD
The connecting rod "connects" the piston to the crankshaft. The bottom of it is attached to a journal on the crankshaft, and its top is connected to the piston by means of a wristpin.

7. PISTON SLEEVE
The sleeve acts as a liner between the piston and the engine block. Its hardened inner surface protects the engine block against the wear and tear of piston movement and the combustion process. High-performance engines usually have a brass sleeve that is chrome plated—referred to as "ABC construction" (Aluminum piston, Brass sleeve, Chrome plating). In budget-oriented engines, ABN construction (Aluminum piston, Brass sleeve, Nickel plating) is more common.

The sleeve has between two and 11 ports that allow fresh air/fuel mixture and exhaust gases to enter and leave the engine.

8. CARBURETOR
The carburetor, or "carb," meters the flow of fuel and air into the engine and is available in two versions—slide and rotary. More common on 3.5cc (.21ci) engines, a slide carb usually provides more bottom-end power and quicker response. Most 2cc (.12ci) engines have a rotary carb—less responsive but easier to adjust.

9. FLYWHEEL COLLET
The tapered flywheel collet fixes a flywheel to the engine's crankshaft.

10. CARB RETAINER
Carbs are usually attached to the engine block with a pinch-style retainer, a screw, or several screws. The pinch retainer allows you to rotate the carb to obtain the optimum linkage angle.

11. ENGINE BLOCK
Machined from aluminum, the engine block is home to all the engine's components. It features the transfer ports that allow the air/fuel mixture to pass from the crankcase and into the combustion chamber.

12. EXHAUST GASKET
The exhaust gasket comes in many shapes and forms, but its purpose is always to prevent exhaust gases from leaving the exhaust system prematurely.

13. CRANKSHAFT BEARINGS
The crank bearings simply permit the crankshaft to rotate freely when the engine is running. The quality and condition of these bearings can significantly impact engine performance.

14. CRANKSHAFT
In a 2-stroke nitro engine, the crankshaft has a couple of jobs: it transfers the power of the combustion process to the drive train, and it regulates when the air/fuel mixture is delivered to the crankcase via the crankshaft ports. (The crankcase is the open area in the bottom of the engine—beneath the piston and around the crankshaft.) As the engine rotates, the window, or port, in the crankshaft opens and closes beneath the carburetor.

15. BACKPLATE
The rear cover, or backplate, allows access to the crankcase for maintenance.

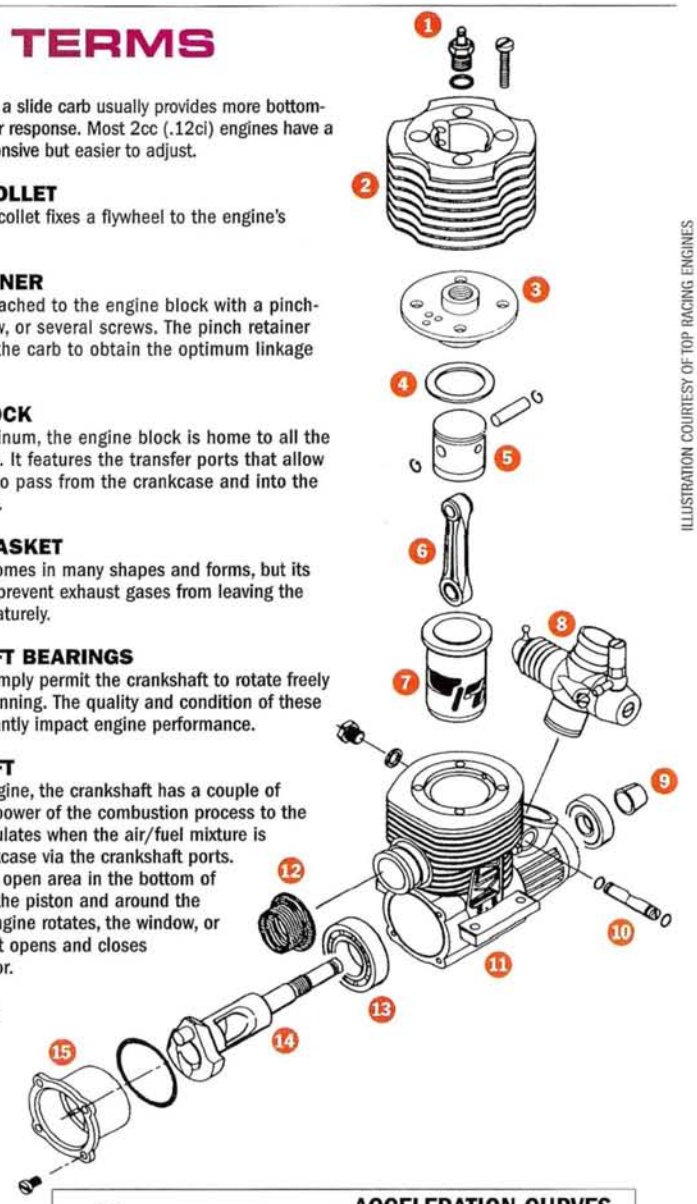
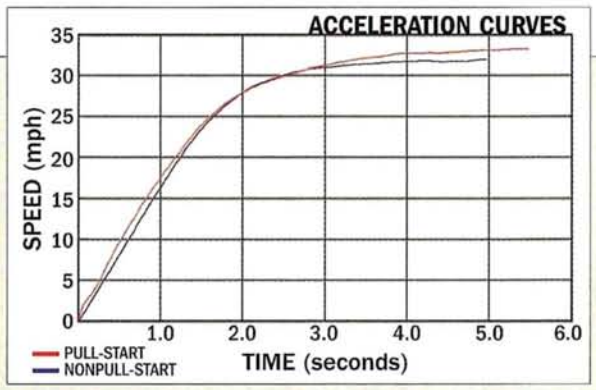


ILLUSTRATION COURTESY OF TOP RACING ENGINES

To pull or not to pull? That is the question.

Racers don't run pull-starters on their engines because a starter robs an engine of power. The crankshaft has to spin the extra mass of the pull-starter's drive dog, and the one-way bearing the drive dog rides in increases drag. But how much performance difference is there really? We wanted to find out once and for all with a real-world test. We set up our Stalker Acceleration Testing System radar to test an Associated RC10GT RTR with its pull-starter-equipped engine, and then we converted the engine to bump-start (see the "How To" in this issue) and shot it past the radar again.



The result? The bump-start engine did have a very slight edge over the pull-start, but the key words are "very slight." If a bump-start engine's needle settings are just an ⅛ turn out of tune, it will be slower than an otherwise identical, but correctly tuned, pull-start engine. If you know how to get the most power from an engine, and you drive well enough to exploit the slightly better performance of a bump-start engine, then that's your choice. For most drivers, a pull-start will not have any negative effect on the driving experience—but it will make starting much more convenient.

Distance traveled in:

	0-1 sec.	0-2 sec	0-3 sec.	0-4 sec.	0-30mph time	Top speed	Time to top speed
PULL-START ENGINE	12.47 ft.	46.66 ft.	90.65 ft.	136.84 ft.	2.46 sec.	32.07mph	4.96 seconds
BUMP-START ENGINE	14.31 ft.	49.18 ft.	93.13 ft.	140.33 ft.	2.50 sec.	33.3mph	5.38 seconds

TRINITY/PICCO

P12 REAR-EXHAUST

Trinity's latest high-performance engine offers rear-exhaust technology that's claimed to ensure better performance than the standard side-exhaust unit. It's of the same high-quality construction as the side-exhaust P12, but a slide carb is an additional option.

AT A GLANCE

Claimed hp	1.25
Rpm	35,000
Carb	Rotary, slide
Crank	Standard, short
Construction	ABC
Pull-start available?	Yes

YOKOMO

RX-12 HYPER S

First released with the highly competitive GT-4 touring car kit, the reliable RX-12 features a slide carb, ABC construction and a large heat-sink head to keep it cool. **Yokomo USA, Airport Business Center, 17951 Skypark Cir., Ste. K, Irvine, CA 92614; (949) 252-8663; www.yokomousa.com.**

AT A GLANCE

Claimed hp	0.85
Rpm	32,000
Carb	Slide
Crank	SG
Construction	ABC
Pull-start available?	No

Cranks and carbs

THERE ARE TWO TYPES of carburetors and two types of crankshafts (or, more precisely, crankshaft ends) in RC; here's what they are, what they do and why you should care:

<< THREADED

SG STYLE >>

CRANKSHAFTS

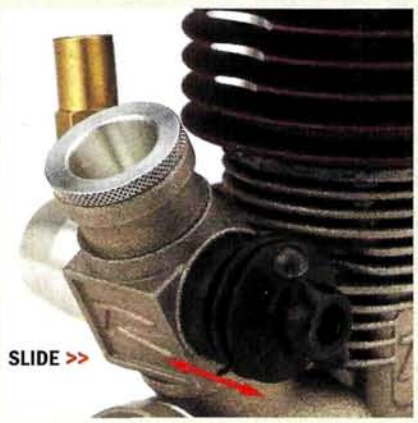
* **THREADED CRANKSHAFTS.** Most engines have threaded crankshafts—holdovers from RC airplane glow-engine designs. To install the clutch assembly, you screw a clutch nut over the shaft. In some cases, the shaft must first be cut to a certain length so the clutch nut will be properly spaced relative to the engine. The downside to having a threaded crankshaft is precision: the required clutch nut brings the potential for runout (wobble), which can make gear mesh uneven. The clutch nut might also loosen.

* **PILOT SHAFT, OR SG-STYLE CRANKSHAFTS.** An "SG" crank isn't threaded in the area in which the clutch bearings ride, so the clutch is installed directly on the crankshaft without the need for a separate clutch nut. SG-type crankshafts simplify clutch installation and ensure a clutch assembly that spins true.

CARBURETORS

* **ROTARY CARBURETORS.** Most engines use rotary carbs because they're less expensive, and most vehicles are designed to accept them. Rotary carbs also take up less room because they don't have a telescoping slide valve. The downside of having a rotary carburetor is poor airflow through the carburetor at partial throttle settings. Incoming air only gets a straight shot through the carb at full throttle; because of the rotation of the carb's barrel valve, the incoming air has to "go around a corner" when the carb is set at partial throttle. This disturbance in airflow makes the transition to full throttle less smooth.

* **SLIDE CARBURETORS.** A slide carb provides a smoother, more linear throttle response because the incoming air goes straight through the carb regardless of throttle setting. The drawbacks are cost and fit; unless they're designed for racing, most .12-powered nitro cars don't accept slide carbs. ■



SLIDE >>

ROTARY >>

Above: at partial-throttle, a rotary carburetor requires incoming air to "turn a corner" as it passes through the carb body. The disrupted flow makes rotary carbs transition less smoothly to full throttle than slide carburetors.

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RACER news

by Greg Vogel and Derek Buono

Associated's Craig Drescher takes Reedy International Race

You met Craig in last month's "5 Questions," and now he's gone and won the European Reedy International Touring Car race! After qualifying, David Spashett and his Trinity-powered Losi Triple-XS prototype were top qualifier with Craig in third, but it's what goes down in the Mains that counts. Craig and David each won one of the triple A-mains, leaving the third and final Main to decide the victor. The two had a bumper-to-bumper race until the final lap, when Craig's TC3 edged out David and his Losi for the win. Congratulations to Craig, Associated and Reedy for winning, and bonus congrats to Mike Reedy for putting on another great event.

Racing for a Cause

Racing doesn't always have to be for a trophy or a title. The second annual Race Against Cancer in memory of Brian Raff was held in April; 137 entrants raised money for the American Cancer Society. Of lesser importance was winning the trophy; the real prize was the cash donation to this vital cause. Sixty-three RC and local companies sponsored the event. If you or your company are interested in becoming a sponsor, visit http://www.raceagainstcancer.org today to sign up or learn more about the next race.

Schumacher wins 4 national titles in 1 week

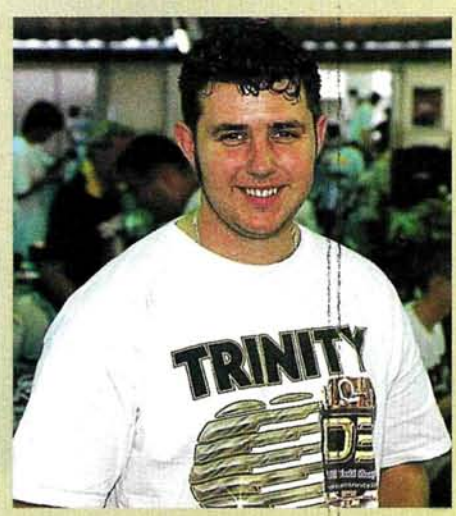
The Axis 2 had a great racing week across the globe, taking no fewer than four national titles. Paul Lemieux won the 2001 NORRCA Indoor Carpet Nationals; Vincent Heligoin took the first round of the French Nationals; Teemu Leino won the Finland Nats, and Steen Graversen nailed the Danish Nationals. To win that many races in a year would make anyone proud, but in a week ...? Pretty impressive!

Mike McMahon joins Schumacher

Schumacher has picked up Mike McMahon for the remainder of the 2001 season. Mike brings a wealth of carpet experience to the team, and he will also run Fantom motors with the SMC crew matching his packs.

Ralph Burch and Chris Doseck get "XRAY'd"

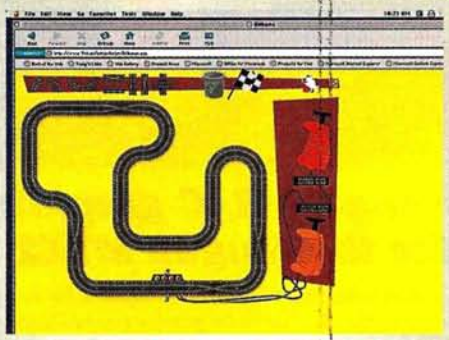
One of the greatest nitro drivers ever—Ralph Burch—has returned to the electric-powered world behind the wheel of the XRAY T1 touring car. Ralph has a winning résumé that lists 22 ROAR national championships, including 2000 Winterchamps firsts in 1/8 and 1/10 scales and the 1/10 2WD ROAR championship for the last three years. Joining Ralph is another notable driver— Chris Doseck, who is best known for his 1990 IFMAR 1/12 World Champion title.



"Reunited and it feels so good"

Spashett and Losi are together again. After about six months behind the wheel of a Yokomo, Spash is back with Losi just in time to drive the Triple-XS. He won the Worlds back in 1998 with a Street Weapon, so we know there's good Spashett/Losi mojo at work.

SITE SEEING



WWW.TV4.SE/LATTJO/KOJAN/BILBANAN.ASP

If you are having race withdrawal, check out this site. You get to build your own slot-car track and then race. You can either race a buddy who is sitting next to you or the computer parrot, who isn't, by the way, very good. Polly want some throttle control?

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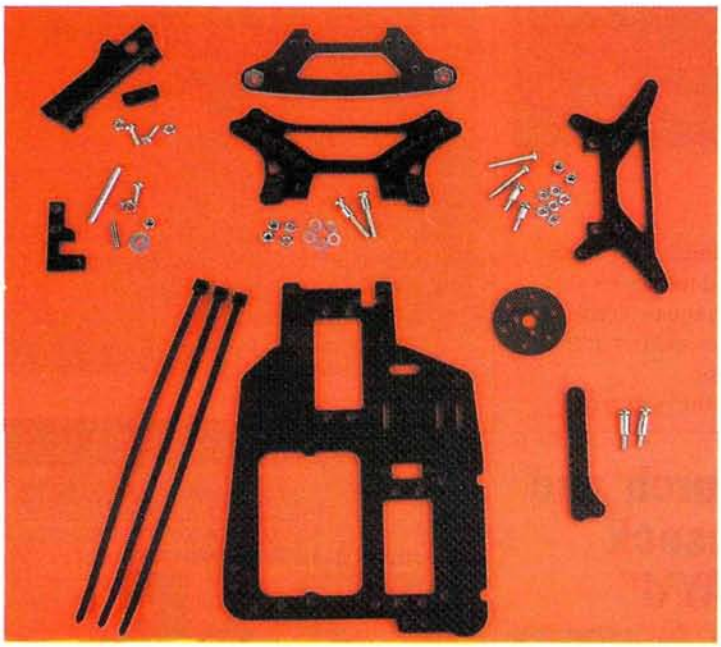
SPEED SHOP

Niftech TC3 drive-train upgrades

Niftech has some cool new upgrades that will significantly lighten and strengthen the TC3 drive train. The outdrives are super light and constructed of hard-coated 7075 aluminum for low rotating mass and long life. The "micro-fine" adjustable differential assembly allows precise adjustments to get the perfect diff setting and supersmooth diff action. A setscrew ensures that the adjustment stays where you set it. Niftech also offers a selection of high-performance bearings for the TC3. The metal-shielded bearings cause less drag than rubber or fiber-sealed bearings.

Hard-coated TC3 outdrives—part no. 2300-TC3-ODA, $69.95/set of 4.
Micro-fine adjustable inner diff—2100, $19.95.
Notched diff rings—2002-TC3-4R, $14.95.
Bearings—1016-TC3-ST (⅜x⅝ in.), $7.95/each; 1017-TC3-ST (3/16x5/16 in.), $4.95/each; 1018-TC3-ST (3/16x⅜ in.), $4.95/each.



Penguin R/C graphite parts for the Mugen MTX2

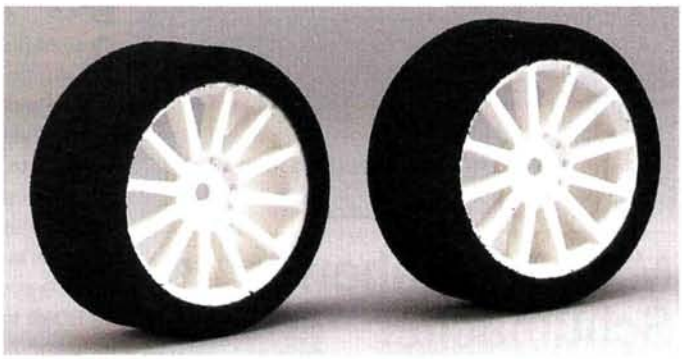
Penguin specializes in graphite upgrades for many vehicles, and the Mugen MTX2 is the next car to be given a graphite bonus. Currently available are the center chassis brace, performance upper deck, bulkhead/brake support, front and rear shock towers, front bumper support and performance brake disc. The woven graphite parts are much stronger than the molded plastic parts they replace.

Performance brake disc—P6000, $4.99.
Front bumper support—P6001, $4.99.
Performance upper deck—P6002, $38.99.
Center chassis brace—P6003, $4.99.
Bulkhead/brake support—P6004, $8.99.
Shock tower (F/R)—P6006/P6007, $14.99/$15.99.

Hardcore Racing Factory Team GT chassis

Hardcore's new titanium chassis for the Factory Team GT is fully countersunk and has raised edges for increased stiffness (as if titanium needed any help). A titanium front skidplate is also available. The heavy-duty front plate is made from the same super-strong ti, and it protects the front end from scratches. All the parts are available in blue, purple, green and silver anodizing.

GT titanium chassis—HCR-00200, $150.
GT titanium front nose skid—CG002, $32.



Yokomo mounted touring foams

Foams seem to be the latest trend in nitro sedan racing, and Yokomo offers a complete lineup of them mounted on stylish 12-spoke wheels. They are 26mm wide and come in all the popular foam compounds.

Yokomo mounted foam tires (26mm)—part nos. vary, $21.95/pair.

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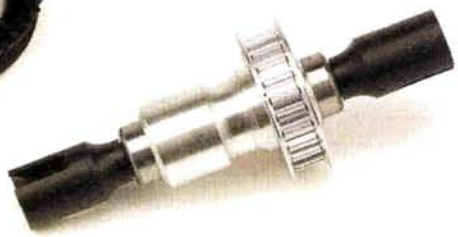
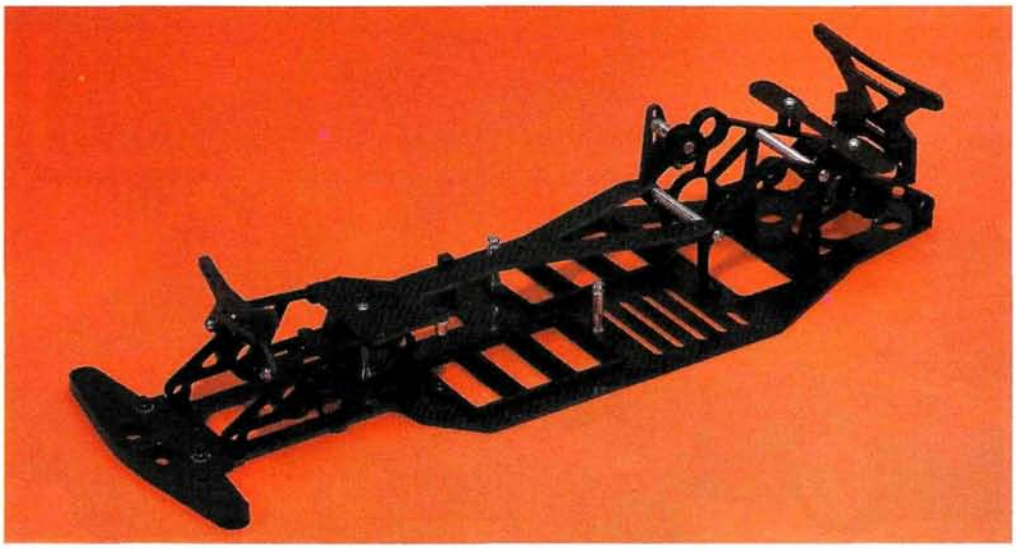
KYOSHO
THE FINEST RADIO CONTROL MODELS

Yokomo front one-way and solid rear axle for the GT-4



At last! Here are the parts that Baker and Tosolini used in their 1-2 national victory with the GT-4. With the solid rear axle and front one-way, the car will launch out of corners harder and leave those silly gear diffs in your dust. On smaller, tighter tracks, you may want to leave the gear diff in the rear of the car. The front one-way is a must-have when foam-tire wear puts extra stress on your front diff.

Front one-way unit—ZE-540T, $56.50.
Solid rear axle—ZE-550, $20.



Corally C4.1 conversion kit

Dreaming of adding the extra tenth to your C4? Corally now offers a quick fix for your C4.1 desires. The new conversion includes everything you'll need to upgrade to the C4.1, including a new chassis upper deck, bulkheads, belt tensioner and belts. It isn't the cheapest thing you can buy, but it will upgrade your C4 for less than it would cost to buy the whole kit.

C4.1 conversion kit—00153, $189.

Race Keeper track software

Race Keeper brings racing software out of the days of Univac with a new idea: Windows! The new software makes race organization simple; the system sets up heats, solves frequency conflicts and displays race data, including the top three drivers' pictures—great for settling post-race squabbles. "Yes, I'd like to see the guy who was driving car three. He hacked me out of first place as I was putting him down a tenth lap during the last ten seconds of the race. And do you have a first-aid kit here? Keep it handy." The software is AMB-and AMB RC System-compatible.

Race Keeper R/C Race Management and Timing Software—$299.

TRACK THREADS

DuraTrax gear

If you run DuraTrax race equipment, you have to sport some DuraTrax threads at the track; the company offers a big selection of clothes. The hats are available in charcoal/black and khaki/navy, and the shirts are available in a variety of sizes and styles.

Hats—$9.99; sport crew—$14.99 to $16.99; T-shirts—$9.99 to $11.99 (part numbers vary with size).

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5 QUESTIONS

Mark Pavidis

Age: 29
Sponsors: Associated, Reedy, Pro-Line, Airtronics, LRP, Kyosho and MIP
Last big win: in 1/8 scale at the 2001 Midwest Gas Championships in Columbus, OH
When I'm not racing: I am working at Pro-Line and spending time with my family.

Radio Control Car Action: Do you believe that everybody in the world has a twin? Have you ever taken a good, hard look at assistant editor Kevin Hetmanski?
Mark Pavidis: No, I haven't.

Kevin

Mark

RCCA: You should; it's scary. Scary for you. OK, next question: Scott Hughes says he whups your butt in foosball daily. Is there any truth to that?
MP: No, it isn't true. "The Squirrel" talks a lot of game. The truth is that Scott lost so frequently, he bought the game from Todd Mattson, and it is now at his house.

RCCA: The off-road Worlds are rapidly approaching. What are your feelings about the event? Who do you think has the best chance of winning?
MP: Personally, I would much rather race in an area of the world that would be better for the hobby. It is very expensive for teams to send drivers to South Africa, so you will only see maybe 20 of the world's best drivers. That's sad, but it is the World Championships any way you look at it, and it's a very prestigious race to win. Right now, I feel that Team Losi has a good chance of winning. Losi has been on a roll, but the Worlds are in October, which is a ways away, and things can change. I'll try and change that!

RCCA: You drive a variety of vehicles; do you find one more difficult to drive than the other?
MP: Touring car is definitely the most difficult to drive because at the level I have to compete, the car must be perfect. Touring cars are so fast now ... they're often too fast, especially when you have Mike Reedy building motors for you.

RCCA: Nice plug. What do you do to prepare for big races such as Nationals or Worlds?
MP: Before I go to a large event such as the Nationals, I often race locally to prepare. A lot of top drivers do this—some, a lot more than others. Practice is practice, and it's best to practice against other people to gauge how fast you are.

UNDER THE HOOD

MARK'S STANDARD ASSOCIATED B3 SETUP

Mark's B3 looks stock—it isn't.

FACTORY OPTIONS

■ Associated chassis protectant film ■ MIP shiny CVDs

MARK'S STANDARD SETUP

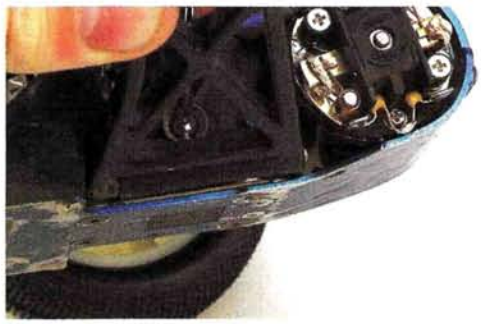
	FRONT	REAR
Toe	0°	3°
Ride height	Arms level	Universals level
Camber	-1°	-1°
Camber-rod locations (hub/bulkhead)	–/outside	Inside/inside
Caster	25°	–
Rear hub spacing	–	Forward
Swaybar	None	None
Ackerman location	Standard	–
Battery position	Center	–
Shocks		
–fluid	35WT	25WT
–piston	2	1
–springs	Blue	Silver
–limiters	1 thin	None
–mounting location (upper/lower)	Outside/outside	Outside/outside

MODIFICATIONS

Mark's B3 has some cool factory driver mods. The chassis is milled out so the battery sits lower in it, and this results in a slightly lower center of gravity (CG). Another mod that is less obvious is the addition of small brass spacers beneath the front and rear suspensions. They lower the car's entire chassis about 1mm, which in turn further lowers the CG. Mark also added about 1 ounce of lead weight to the front bulkhead.

EQUIPMENT

RADIO SYSTEM: Airtronics M8
STEERING SERVOS: Airtronics 94457
ESC: LRP
RECEIVER: LRP
BATTERY: Reedy Zappers
TIRES/INSERTS: Pro-Line
RIMS: Pro-Line
BODY/WING: Pro-Line/Deja Vu Tu

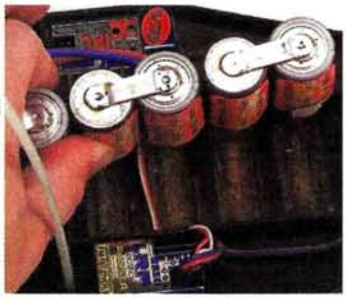


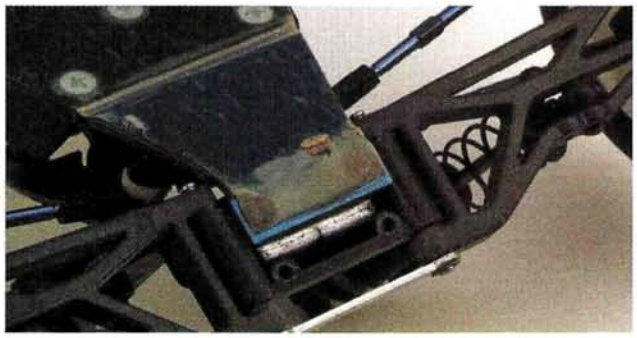
A shim cleverly placed under the rear arm mounts helps lower the car's CG.

FACTORY DRIVER HOT MOD

This little button-head screw holds the battery down. Have you ever heard a loud slap when your car lands? If the batteries aren't held tightly, they slap off jumps. This easy mod will fix it.

Mark used the Associated chassis protector to cover the screw heads and protect the batteries when the chassis hits off a big jump.





Mark and most of the other Associated drivers cut slots in the bottom of the chassis to lower the batteries. Choose your battery position carefully because once you've chosen, that's its position for life.

Mark added about 1 ounce of lead weight to the front for better balance.

SOURCE GUIDE

AIRTRONICS
1185 Stanford Ct., Anaheim, CA 92805; (714) 978-1895; www.airtronics.net.

ASSOCIATED ELECTRICS
3585 Cadillac Ave., Costa Mesa, CA 92626-1403; (714) 850-9342; www.rc10.com; www.teamassociated.com.

CORALLY
Distributed by Specialized RC Intl., 1480 S.R. 436, Casselberry, FL 32707; (407) 681-5906.

DURATRAX
Distributed by Great Planes Model Distributors, 2904 Research Rd., P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948.

FMA DIRECT
9607 Dr. Perry Rd. #109, Ijamsville, MD 21754; (800) 343-2934; fax (301) 831-8987; www.fmadirect.com.

HARDCORE RACING COMPONENTS
25435 Rye Canyon Rd., Valencia, CA 91355; (661) 294-5032; www.racinghardcore.com.

LOSI
Distributed by Horizon Hobby Inc., 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.

LRP ELECTRONIC
Distributed by Associated Electrics and available from LRP Electronic, Wilhelm-Enssle-Strasse 132-134, 73630 Remshalden, Germany 1149-7181-4098-0; www.lrp-electronic.de.

MUGEN USA
20914 Blake Pky., Ste. 106, Lake Forest, CA 92630; (949) 707-5607; www.mugenracing.com.

NIFTECH
5565 Wilson Dr., Mentor, OH 44060; (440) 257-6018; www.niftech.com.

PENGUIN R/C
1230-P N Jefferson St., Anaheim, CA 92807; (714) 630-9015.

PRO-LINE/JACO
P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; www.pro-lineracing.com.

REEDY MODIFIEDS/ TEAM ASSOCIATED
3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342; www.teamassociated.com.

SCHUMACHER USA
6302 Benjamin Rd., Ste. 404, Tampa, FL 33634; (813) 889-9691; www.racing-cars.com.

YOKOMO USA
Airport Business Center, 17951 Skypark Cir., Ste. K, Irvine, CA 92614; (949) 252-8663; www.yokomousa.com.

LAST LAP

If you could have your own theme music played as you climbed the drivers' stand, which tune would you choose, and why?

"Welcome to the Jungle" by Guns N' Roses because it's survival of the fittest (so to speak), and there's NO MERCY!

—Julian Case

I'd have "Bittersweet Symphony" played as I walked up the stand because it sounds cool, and it's kind of like RC; you win some, and you lose some. You may lose, but it's still fun.

—Eric Poticny

Anything by Motörhead because it puts me in the mood to go get reckless during the race, and that sums up my driving style: reckless. I have very little patience, and I let it all hang out. If it isn't broken, you didn't drive hard enough.

—Randy Hynd

I would have the "Star Wars" theme music because—why not? That has to be the coolest music for a great entrance, and as long as I don't stink in the race, it would be well suited for me.

—Ian Burlingham

It would have to be RKL's "Think Positive." The early '80s punk tune gets your adrenaline racin' through your veins and would sound really intimidating to other racers.

—Gordon Tinderholt

The theme music that I would like to have, if I could, would be a song called "Eclipse" by Yngwie Malmsteen.

—Roberto Vidal

"Another One Bites the Dust" by Queen—for all the losers I beat (all in good fun, of course).

—Brian Doering

"Rollin'" by Limp Bizkit. I'd pick this song because I like it, and it would make everyone else feel like a chump!

—Sid Perkins

I would listen to that "Bye, Bye, Bye" song from 'NSync.

—Kevin Hetmanski

NEXT MONTH'S QUESTION

Would you rather win the B-main or finish last in the A-main? Why?

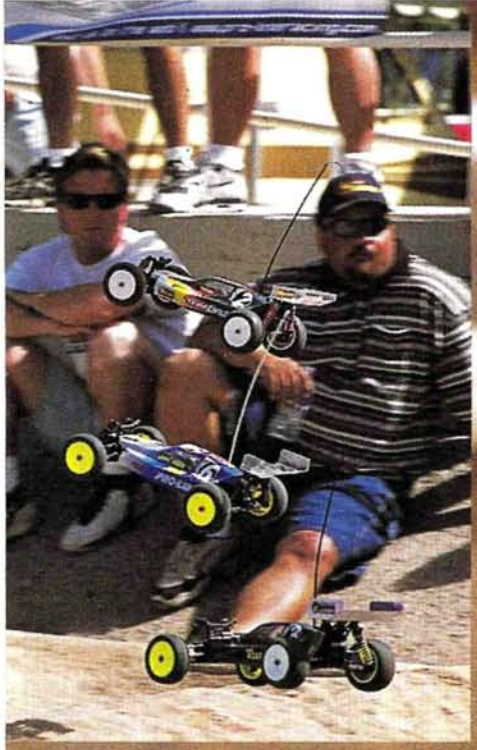
Respond by clicking "Last Lap" at www.rccaraction.com, or email your responses to gregv@airage.com. ■

15th ANNUAL

Pro-Line & RC Car Action CACTUS CL

by George M. Gonzalez

When winter turns into spring, hundreds of racers pack their gear and head to Scottsdale, AZ, for the Pro-Line and *RC Car Action* Cactus Classic. Scottsdale RC Raceway has hosted this event for the last 15 years and, because of its excellent customer service and awesome track, the attendance has remained high year after year. This year's event was a complete sellout, and racers from all over the country brought their tents and



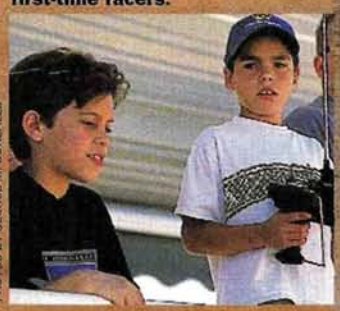
Racing fun under the Arizona sun

Brian Kinwald won both the 2WD and Truck Mod classes, while Matt Francis cleaned up in 4WD Mod. These guys put on quite a show.

Billy Easton and Mark Pavidis catch some shade on the Pro-Line flatbed truck.

ASSIC

motor homes to keep comfortable under the hot Arizona sun. All the big names in RC were there, so many of the local racers got to mix it up with Team Losi/Team Trinity drivers Brian Kinwald and Matt Francis as well as the A-Team's Billy Easton, Scott Hughes and Mark Pavidis. Turn the page to find out how it all went down.



Many youngsters competed in the Stock classes; very few events accommodate first-time racers.

PHOTOS BY GEORGE M. GONZALEZ

QUALIFYING AND A-MAIN ACTION

2WD STOCK

Kurt Haynes from Yorba Linda, CA, set the top qualifier (TQ) pace in the first round after posting a 12/4:15.11. Haynes was unable to better his first-round score, but nobody else could beat it either. Jeff Stanneart, Theo Captanis, Scott Proehl, Lee Caldwell and John Henry all put in great 12-lap runs and finished within 1 second of one another.

Haynes easily won the A-Main and finished more than half a lap in front of his nearest competitor, which happened to be Proehl. Captanis ended up winning the battle for third.

2WD EXPERT STOCK

Local Arizona resident Brent Thielke drove his Race Prep/Pro Match powered B3 into the TQ position after posting a blazing fast 13/4:19.30 best time in the fourth and final qualifying round. This bummed out Brian Westerman, who was holding on to the TQ with a best time of 13/4:19.59. Talk about splitting hairs! Thielke and Westerman were the only drivers to break through the 12-lap barrier during qualifying.

The racing wasn't as close during the A-Main as it was during the qualifiers because of the dreaded first-turn pileup. Thielke managed to avoid the carnage, but Westerman wasn't as lucky. As a result, Thielke ended up winning the race with ease and was the only driver to put in a 13-lap run during the Main. Jason Jakubczyk finished second, while Ryan Maifield claimed third.

2WD MODIFIED

All the big guns were there for this class! After four rounds of qualifying, it was Team Trinity/Team Losi factory driver Matt Francis' name that appeared on top of the qualifying roster. Trinity/Losi factory driver Brian Kinwald came in second with a best qualifying time that was nearly 2 seconds slower than his teammate's; this is a large margin at this level of competition. Team Losi/Peak Performance driver Travis Amezcua, Team Associated/Reedy/Pro Match driver Jim Gard and Team Losi/Peak Performance driver Gregg Hodapp all looked particularly good during qualifying; but to be fair, all 10 A-Main finalists finished on the same lap within a few seconds of one another.

The Modified class contestants faced a triple A-Main format and were awarded points according to their finishing position in two of the three Mains (each driver's worst finish was thrown out and held in reserve in case of a tie). Kinwald ended up winning the first two Mains to claim the championship, but he didn't have it easy—his own teammate (Francis) lead the way in the first two Mains,

WINNERS

FINAL	QUALIFYING	DRIVER	CHASSIS	MOTOR	BATTERY	ESC	RADIO	TIRES	PINION/SPUR
2WD STOCK									
1	1	Kurt Haynes	B3	Reedy	Reedy	Novak	Airtronics/M8	Pro-Line/Losi	23/81
2	4	Scott Proehl	Triple-X	Team Orion	Pro Match	Novak	JR	Losi	24/81
3	3	Theo Captanis	Triple-X	Trinity	Trinity	LRP	Airtronics/M8	Losi	23/81
4	8	Mark Abrahim	Triple-X	Trinity	Team Orion	LRP	Airtronics/M8	Losi	21/82
5	2	Jeff Stanneart	Triple-X	Trinity	Pro Match	Tekin	Airtronics	Losi	23/84
6	0	Tunie Molina	Triple-X	Birdman	World Class	Novak	Airtronics	Losi	22/92
7	7	Lee Caldwell	Triple-X	INS*	INS	Novak	INS	Losi	22/82
8	9	Scott Pipher	Triple-X	Reedy	Team Orion	Tekin	Airtronics	Losi	22/82
9	7	David B. Paul	Triple-X	Trinity	World Class	Tekin	Airtronics/3PS	Losi	23/78
0	6	John Henry III	Triple-X	Team Orion	Ballistic	LRP	Airtronics/3PS	Pro-Line/Losi	24/96
2WD EXPERT STOCK									
1	1	Brent Thielke	B3	Race Prep	Pro Match	LRP	Airtronics/M8	Pro-Line	22/81
2	4	Jason Jakubczyk	Triple-X	Fantom	SMC	LRP	Airtronics/M8	Losi	23/82
3	3	Ryan Maifield	B3	Reedy	Reedy	Novak	Airtronics/3PS	Pro-Line	22/82
4	7	Andrew Smolnik	Kyosho	Trinity	Trinity	LRP	Airtronics/M8	Pro-Line	24/82
5	2	Brian Westerman	Triple-X	Peak	WC	Novak	Airtronics	Losi	23/82
6	0	Brent Newman	Triple-X	Trinity	Trinity	INS	Airtronics	Pan/Losi	27/92
7	5	Jon Ringer	Triple-X	Fantom	Trinity	LRP	Airtronics/M8	Losi	23/78
8	8	Bill Mitchell	Triple-X	Trinity	Peak	Novak	Fut/3PJ	Losi	21/82
9	6	Trevor Clement	Triple-X	Trinity	Trinity	LRP	Airtronics/M8	Losi	25/92
0	9	Roman Gastelum	Triple-X	Fantom	Stevos	Novak	Airtronics	Losi	22/78
2WD MODIFIED									
1	2	Brian Kinwald	Triple-X	Trinity	Trinity	Novak	Airtronics/M8	Losi	25/92
2	1	Matt Francis	Triple-X	Trinity	Trinity	LRP	Airtronics/M8	Losi	23/92
3	3	Travis Amezcua	Triple-X	Peak	Peak	Novak	JR/R1	Losi	22/78
4	8	Jimmy Babcock	Triple-X	Team Orion	Team Orion	LRP	Airtronics/M8	Losi	20/82
5	6	Jason Corl	Triple-X	Team Orion	Team Orion	LRP	Airtronics/M8	Losi	24/92
6	5	Greg Hodapp	Triple-X	Peak	Peak	Novak	Airtronics	Losi	22/78
7	4	Jim Gard	B3	Reedy	Pro Match	LRP	Airtronics	Pro-Line	19/81
8	0	Mark Pavidis	B3	Reedy	Reedy	LRP	Airtronics/M8	Pro-Line	INS
9	7	Jason Jakubczyk	Triple-X	Fantom	SMC	LRP	Airtronics/M8	Losi	22/78
0	9	Jay Robinette	Triple-X	Peak	Stevos	Novak	JR/R1	Losi	18/84

but mistakes cost Francis the win on both counts. Francis took the overall second-place victory after finishing second in all three Mains—got to love consistency. Amezcua, who had problems in the first two Mains, came back to win the third and final one, which earned him a third-place overall victory.

STOCK TRUCK

Local racer Scott Proehl kept his Trinity/Pro Match powered Triple-XT truck on the fast line to take the TQ honors with a 12/4:15.33. Salt Lake City, UT, resident Mark Ibrahim wasn't too far behind with a 12/4:16.84. Chris Valpey from California's Mojave Desert qualified in third with his Birdman-powered Double-XT.

Things got mixed up during the Main immediately following the first corner. TQ Proehl found his truck tossed rudely to the back of the pack, while Kurt Haynes, who came out of nowhere, ended up in front. Haynes managed to keep his truck on all four wheels for the rest of the race to claim his second Cactus Classic Championship of the weekend. Way to go Kurt! Ibrahim finished on the same lap as the leader, but nearly half a lap behind, to claim second. TQ Proehl had to settle for third.

EXPERT STOCK TRUCK

In this class, the TQ honors went to Brian Westerman from Fort Collins, CO. His Peak Performance/World Class-powered Triple-XT was only 1/100 second faster that Joe Pillars' Fantom-powered Losi truck.

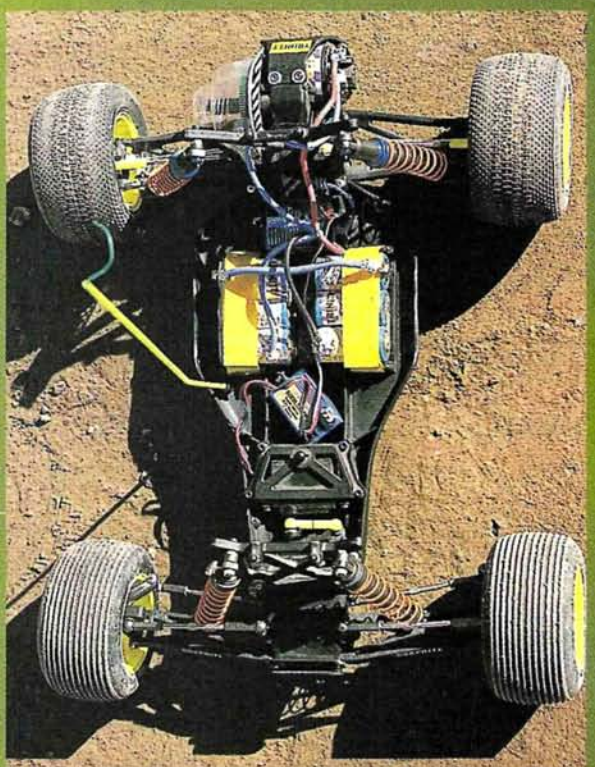
Westerman got a good start at the tone and stayed in front for the duration of the race. He easily won the Main and finished with a large 5-second margin over Rudi Schimek, who finished second. Brandon Beckering ended up in third.

MODIFIED TRUCK

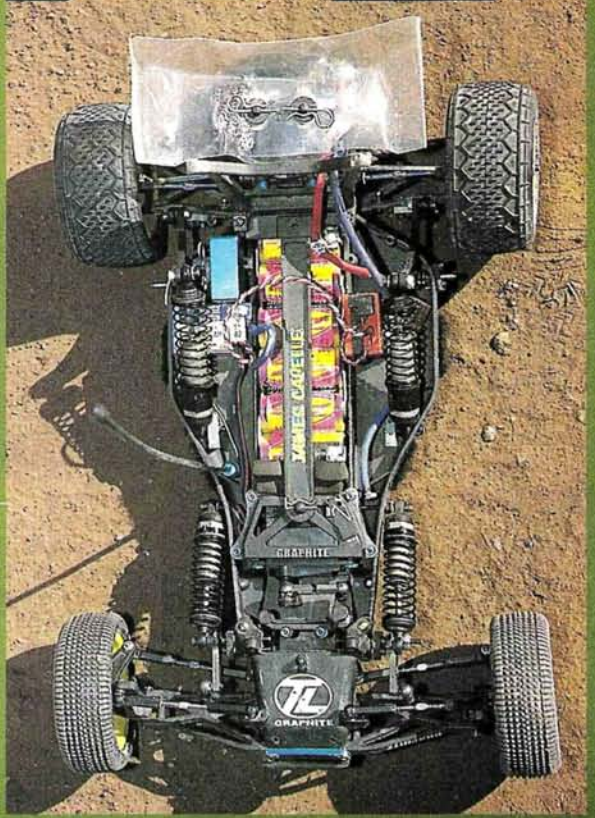
Brian Kinwald repeated his performance from the 2WD Mod class after winning back-to-back Mains in Mod Truck to take the overall championship. Kinwald's only real competition was from TQ Matt Francis, who insisted on giving the spectators a good show. Incidentally, Francis claimed the overall second-place trophy after coming in second in the first two Mains and winning the third. Greg Hodapp claimed the overall third-place trophy after finishing third in the first and last Mains.

Cactus **Creativity**

Today's electric off-road racing vehicles are so good straight out of the box that highly modified "works" cars have all but disappeared. Sure, we all like to add titanium turnbuckles and blue stuff, but most of us run vehicles that are essentially stock. Not these guys! Brent Newman and James Capelle prove that workbench engineering is alive and well with their cleverly modified (and functional) machines. Feeling inspired yet?



Here's Brent Newman's creation. Notice the saddle-pack batteries? According to Brent, this particular battery-mounting system worked quite well on Scottsdale RC Raceway's hard, smooth track.



Check out James Capelle's Losi Triple-X. Notice anything different? Yup; that's a homemade inboard shock system. How well did it work? Capelle won the C-Main with this car. Not bad.

FINAL	QUALIFYING	DRIVER	CHASSIS	MOTOR	BATTERY	ESC	RADIO	TIRES	PINION/SPUR
STOCK TRUCK									
1	6	Kurt Haynes	T3	Reedy	Pro Match	Novak	Airtronics/M8	Pro-Line	17/87
2	2	Mark Ibrahim	Triple-XT	Reedy	Team Orion	Novak	Airtronics/M8	Losi	19/88
3	1	Scott Proehl	Triple-XT	Trinity	Pro Match	LRP	JR	Pro-Line/Losi	3/98
4	0	Chris Higa	T3	Reedy	Intigy	LRP	Airtronics/M8	Pro/Losi	19/87
5	9	Jim Thomas	Triple-XT	Trinity	Team Orion	LRP	Airtronics	Pro-Line/Losi	21/88
6	3	Chris Valpey	Triple-XT	Birdman	Birdman	Novak	Airtronics	Losi	18/86
7	7	Theo Captanis	Triple-XT	Trinity	Trinity	LRP	Airtronics/M8	Losi	19/87
8	4	Scott Fisher	Triple-XT	Trinity	Pro Match	Novak	Airtronics/M8	Losi	20/88
9	8	Jeff Stanneart	Triple-XT	Trinity	Pro Match	Novak	Airtronics/M8	Pro-Line/Losi	20/86
0	5	David Johnson	Triple-XT	PDT	Pro Match	Novak	Airtronics/M8	Panther	18/88
EXPERT STOCK TRUCK									
1	1	Brian Westerman	Triple-XT	Peak WC	INS	Novak	Airtronics	Losi	20/88
2	4	Rudi Schimek	INS	INS	INS	INS	INS	INS	INS-
3	5	Brandon Beckering	INS	Banzai	World Class	INS	INS	INS	20/88
4	7	Mike Friery	Triple-XT	Trinity	Team Orion	LRP	Airtronics/M8	Pro-Line/Losi	21/100
5	8	Trevor Clement	Triple-XT	Trinity	Trinity	LRP	Airtronics/M8	Losi	24/100
6	3	Alex Torrico	Triple-XT	Trinity	INS	Novak	Airtronics	INS	23/100
7	9	Jake McGarvey	Triple-XT	Trinity	Trinity	LRP	Airtronics	Losi	24/100
8	6	Jeremy Kop	Triple-XT	Pro Match	Pro Match	Hitec	Hitec/3D	Losi	21/87
9	0	Charlie Perez	Triple-XT	Pro Match	Pro Match	Novak	Airtronics	Losi	19/87
0	2	Joe Pillars	Triple-XT	Fantom	Fantom	INS	Hitec/3D	Losi	19/88
MODIFIED TRUCK									
1	2	Brian Kinwald	Triple-XT	Trinity	Trinity	Novak	Airtronics/M8	Losi	20/100
2	1	Matt Francis	Triple-XT	Trinity	Trinity	LRP	Airtronics/M8	Losi	21/100
3	8	Greg Hodapp	Triple-XT	Peak	Peak	Novak	Airtronics/M8	Losi	18/88
4	4	Ryan Cavalieri	Triple-XT	Trinity	Trinity	Novak	Airtronics/M8	Losi	19/100
5	6	Jimmy Babcock	Triple-XT	Team Orion	Team Orion	LRP	Airtronics/M8	Losi	18/88
6	3	Billy Easton	T3	Reedy	Reedy	LRP	Airtronics/M8	Losi	18/87
7	5	Jason Corl	Triple-XT	Team Orion	Team Orion	LRP	Airtronics/M8	Losi	20/100
8	9	Jim Gard	T3	Reedy	Pro Match	LRP	Airtronics/M8	Pro-Line	19/87
9	7	Brent Thielke	T3	Race Prep	Pro Match	LRP	Airtronics/M8	Pro-Line	19/87
0	0	Phillip Atondo	Triple-XT	Trinity	Trinity	Novak	Airtronics	Losi	18/88
4WD MODIFIED									
1	1	Matt Francis	Double-X4	Trinity	Trinity	LRP	Airtronics/M8	Losi	21/100
2	3	Brian Kinwald	Double-X4	Trinity	Trinity	Novak	Airtronics/M8	Losi	22/100
3	2	Jason Corl	Double-X4	Team Orion	Team Orion	LRP	Airtronics/M8	Losi	17/86
4	5	Travis Amezcua	Double-X4	Peak	Peak	Novak	JR/R1	Losi	18/86
5	7	Jimmy Babcock	Double-X4	Team Orion	Team Orion	LRP	Airtronics/M8	Losi	17/84
6	6	Brian Dunbar	Double-X4	Fantom	INS	LRP	INS	Losi	19/88
7	4	Todd Hodge	Double-X4	Trinity	Trinity	Novak	JR/R1	Losi	16/89
8	0	Trever Adamo	Double-X4	Trinity	Trinity	LRP	Airtronics	Losi	23/100
9	8	Greg Hodapp	Double-X4	Peak	Peak	Novak	Airtronics	Losi	17/84
0	9	Ryan Cavalieri	Double-X4	Trinity	Trinity	Novak	Airtronics/M8	Losi	21/100

INS = Information not supplied

Kinwald set up his car in a hurry so his friend and race announcer Scott Anfinson could use it in his heat. Can you imagine getting the chance to drive the great Kinwaldo's car. I can fantasize about it, but I don't think Brian would want me anywhere near his car. In case you're wondering: yes, Scott ended up winning his Main with Kinwald's car.

The Britney Spears RC Fan Club (left to right): Brian Westerman (2WD Expert Stock champ), Lars Johnson, Eric Sanchez, Chris Marsh, Jay Robinette and Brent Newman. No doubt, these guys are devoted fans!

4WD MODIFIED

Matt Francis TQ'ed this class, too, for a perfect three-for-three. This time, however, he followed it up with a win. Brian Kinwald, who qualified second, was his only competition during the Mains; but Francis didn't make any mistakes this time around and managed to keep Kinwald at bay. Francis won back-to-back Mains to take the Cactus Classic 4WD Championship. Brian Kinwald claimed second, while Jason Corl rounded up third.

UNTIL NEXT YEAR

The 15th Annual Cactus Classic was a complete success. The weather was perfect, the heats were run without a glitch, and the racing action was intense. We congratulate all of the newly crowned Cactus Classic champions, and we thank Pro-Line for its generous sponsorship and continued support. If you'd like to attend a cool, relaxing RC racing event in a town with a party-like atmosphere, be sure to attend the Cactus Classic. Hope to see you all in Scottsdale next year. ■

BY KEVIN HETMANSKI

More Power! Testing the Hardcore Racing .21 T-Maxx conversion kit

Before the Traxxas T-Maxx came along, .21 engines dominated nitro monster trucking. Kyosho started the trend with its Nitro USA-1, and machines such as the OFNA Monster Blazer and Monster Pirate followed. When Traxxas announced that the T-Maxx would have a .15 engine, nitro pundits were stunned; that just isn't the way it's done! But as we all know, the T-Maxx performs very well with a .15, thanks in no small part to its 2-speed tranny. Although no one thought the T-Maxx was under-powered, many thought that if it ran well with a .15, it would really tear things up with a .21! Sounds great, but the conversion is more easily said than done—unless you have a conversion kit such as the Hardcore Racing setup I review here. It's a beautifully finished and impressively complete package, and it works ... well, you'll just have to keep reading to see how it all came together.

WHAT YOU GET

Hardcore's conversion kit is built around a titanium chassis that is longer and wider than the T-Maxx's stock aluminum platform. The titanium chassis extends the T-Maxx's wheelbase to 350mm (45mm longer than stock); this increases tracking stability and makes room for a .21 engine (.21s are longer from crank tip to backplate than small block .12s and .15s). The T-Maxx's stock rear skidplate and rear drive shaft are too short to accommodate the longer chassis, so Hardcore includes a longer titanium skidplate and drive shaft to solve the problem. The kit also includes a clutch nut, a round-port manifold, a manifold spring and engine mounts to facilitate engine installation. What about a linkage for a slide carb? Hardcore includes an aluminum, bearing-supported bellcrank mounted on a tall aluminum standoff that converts the stock Maxx linkage for slide-carb use.

WHAT YOU NEED

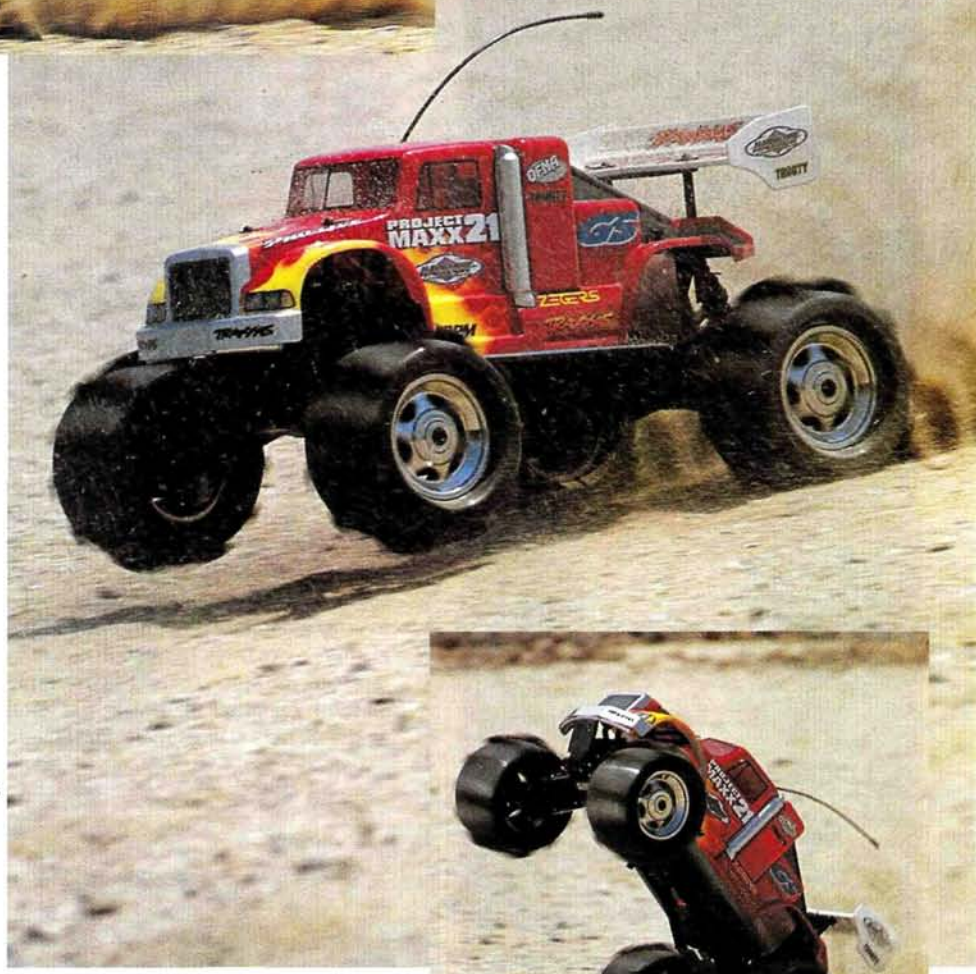
You will need a few things to complete the kit. The most important item (besides a T-Maxx—natch!) is a pull-start .21 engine. There is no room for a starter wheel or starter box underneath the truck, so a pull-starter is the only way to go. The kit includes a header but it does not include a tuned pipe, but any .21 tuned pipe will do the job. And although the stock carb linkage will link the conversion kit's bellcrank to the throttle servo, you have to link the bellcrank and the carb with music wire, two screw collars and a spring. I used a Team Associated kit for the RC10GT.

PERFORMANCE

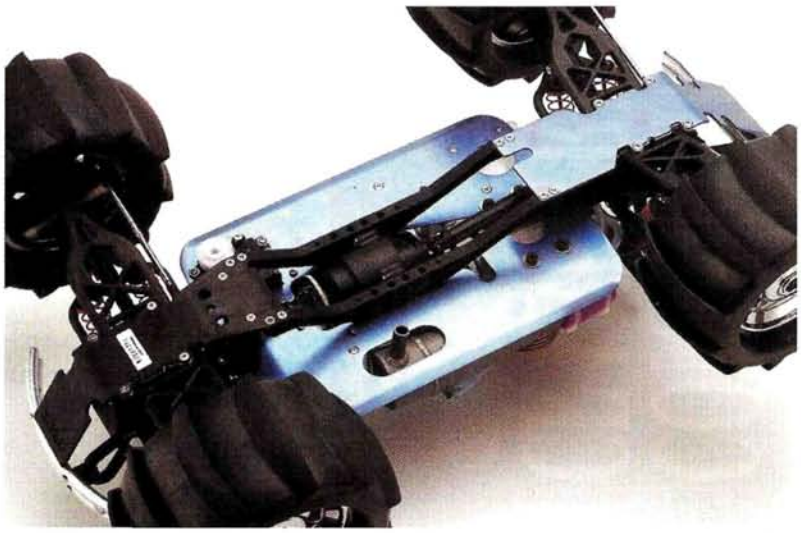
I'll spare you the engine break-in details and get right to the good stuff. I made the first .21-powered runs on pavement for the radar gun, and it only took one squeeze of the trigger to see I had a real fire-breather on my hands. The powerful OFNA engine combined with the stock T-Maxx tranny ratios had the truck launching like a funny car. When the engine was up to temperature, there was plenty of power on tap for wheelies, and acceleration was blink-and-you'll-miss-it quick. After many, many hard launches on high-traction pavement, I expected something in the tranny to let go or to at least get cranky, but the T-Maxx tranny never winced, run after run and shift after shift.

I completed the Hardcore conversion with an OFNA Hyper .21 pull-start engine. It was a good choice; it made plenty of power and ran strongly tank after tank.

I used Pro-Line MAXX Road Rage tires for street running and MAXX Paddles for beach action. These bad boys can excavate some sand in a hurry! The Outback wheels are also from Pro-Line.



Big engine, big rooster-tail and a big-rig body to top it all off. Pro-Line's new Peterbilt shell completes the whole package.



Compare the Hardcore rear skid-plate (included with the kit) with the stock front plate, and you'll see how the chassis extends the T-Maxx's wheelbase.

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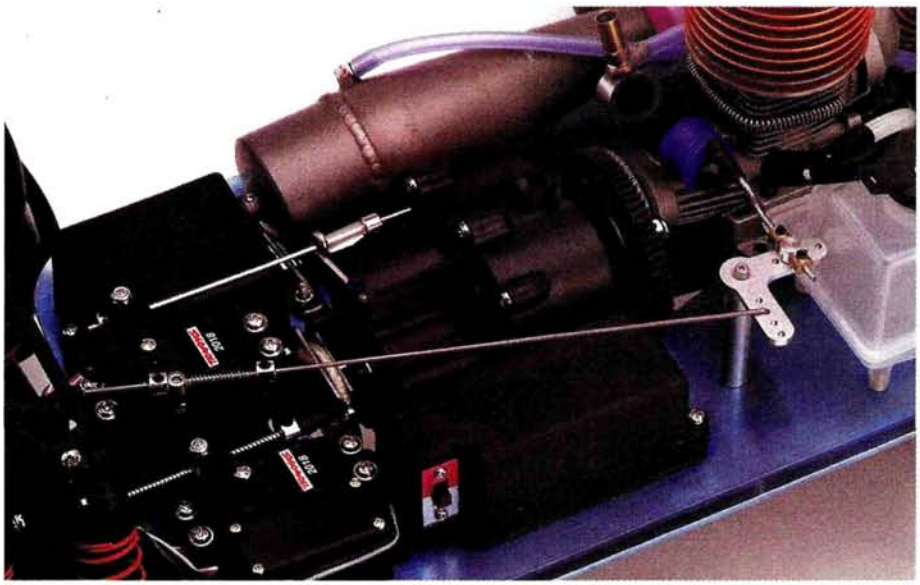

Hardcore includes a precision bellcrank system to tug the slide carb open. You'll have to make the short link that ties the bellcrank to the carb, but the long linkage is the stock Traxxas piece.

For an accurate stock-versus-.21 radar-test comparison, I ran the stock T-Maxx tires and gearing. The modified truck's top speed was barely faster than stock with a best run of 30.9mph, which makes sense, since .21 engines produce greater power but not necessarily greater rpm. To fully exploit the OFNA engine's extra twist, I geared the truck up by replacing the stock 72-tooth spur gear with a 66-tooth gear. Now the T-Maxx was good for 33.6mph, but I wanted more. I installed a set of Pro-Line Maxx Road Rage tires for reduced rolling resistance and saw a 3mph gain, with a best speed of 36.6mph. In addition to the easy-rolling tread pattern, the Road Rage treads tended to "grow" during the run owing to centrifugal force, which increased the truck's rollout—and its top speed.

I also had a set of Pro-Line MaxxPaddles ready on another set of rims that I had set aside for a trip to the beach. If you've ever seen the roost thrown by a sand dragster, you have some idea what it was like to clamp the throttle on the .21 T-Maxx in soft beach sand. The big paddles hurled the stuff about 5 feet into the air, and they hooked up with enough stick to easily lift the truck's front wheels. The T-Maxx kicked up more sand than the tough guy in a comic-book bodybuilding ad! It was quite a show. Although there's nothing inadequate about the T-Maxx's stock .15 powerplant, bumping the truck up to .21 power adds another dimension to its performance that you have to drive to believe.

The wing mount is just a Pro-Line extended rear body mount. To remove the body, I just take out the lower body clips; the body post setscrews aren't used.

Support mods for .21 power

I had no durability issues with the stock T-Maxx parts during testing, but the more powerful .21 engine will increase the rate of wear. So if you plan to install the Hardcore .21 conversion kit on your T-Maxx, you may want to hop it up and make it more durable with some key components. My first modification would be to improve braking by stacking a second disc and brake pad on the brake posts, or swapping the stock parts for a Robinson Racing setup.

Robinson Racing's T-Maxx steel ring-and-pinion kit would also be a wise upgrade. The parts are machined of steel that's then hardened to last longer than the stock parts.

Finally, you may want to invest in a set of MIP CVDs. The CVDs flex less than the stock plastic drive shafts, and that helps get more power to the wheels. The hardened-steel CVDs also handle the .21 engine's horsepower better. MIP offers CVDs for the axles and the center drive shafts; if you use the center drive shafts, you'll be able to install only the front shaft because of the Hardcore chassis' extended wheelbase.

SHOP TALK

I have a serious problem with the spur gear on my Traxxas Stampede monster truck. The small pegs in the gear keep melting the gear and ruining it. I have replaced the gear several times, but the same problem returns. [email]
Jack Hoffman

It sounds as if you have your slipper clutch set too loose. When you give the truck throttle, the clutch slips for far too long. This constant clutch slipping heats up the friction pegs, and this heat melts the plastic gear. The clutch is designed to protect the internal gears from being stripped by allowing the spur gear to slip when the drive train takes a hard hit. To set your slipper clutch properly, tighten the clutch nut all the way and then back it off about ⅛ turn. Then launch the truck on a high-traction surface; the clutch should slip for only a second, if at all. Once you've set your slipper clutch properly, your melted-gear problem should disappear. ■

If you have any problems or questions about trucks, or if there is something you would like to see in "4x4," email me at kevinh@airage.com or send your letters to:
"4x4"
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Ridgefield, CT 06877-4606 USA

SOURCE GUIDE

HARDCORE RACING COMPONENTS
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www.miponline.com.

OFNA RACING
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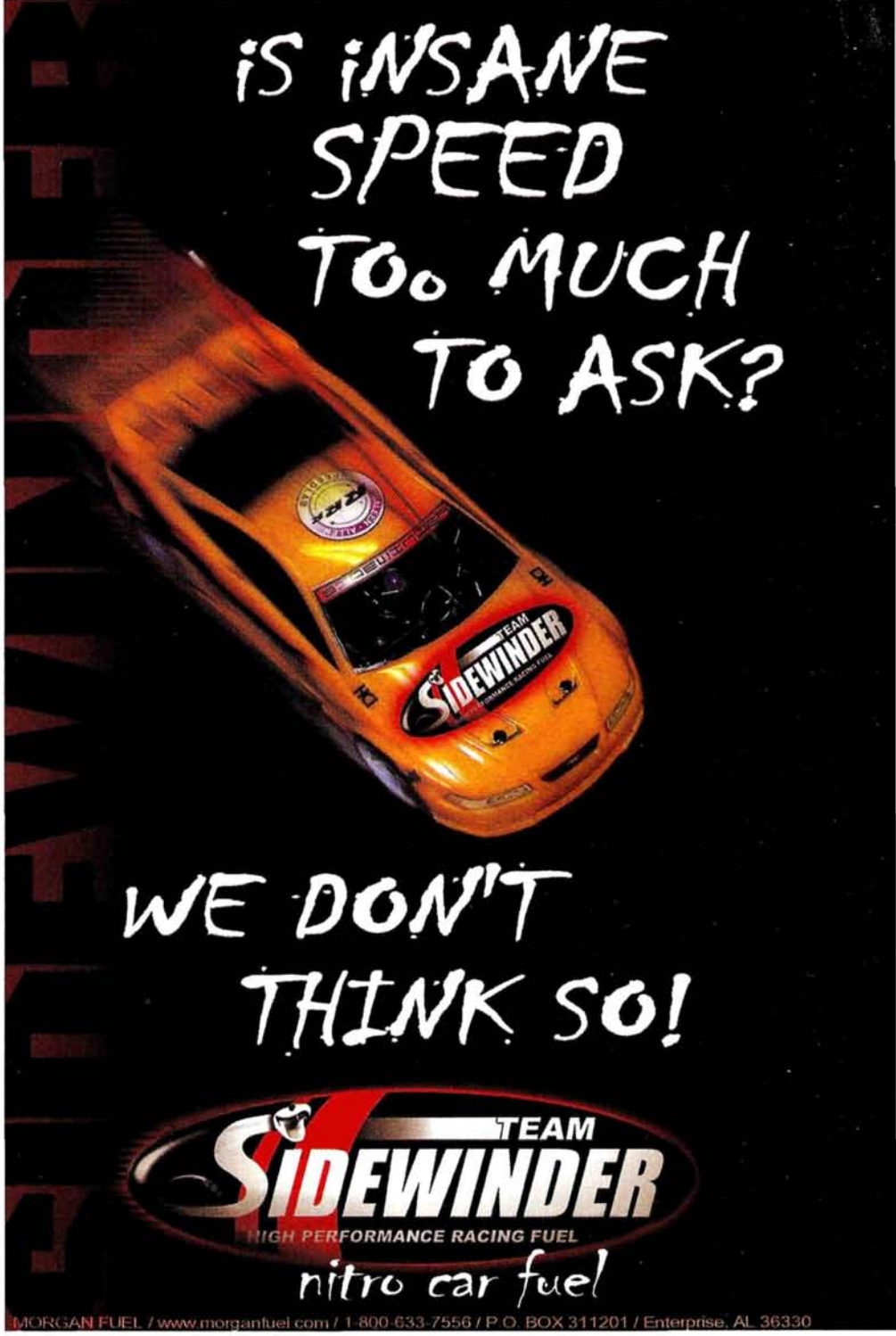


BY BOB HASTINGS

Airbrushing Illuminated Effects

On any Sunday that I'm not at the track, you'll find me in my shop watching racing programs on TV. Beyond the competition, they're always a great source of new paint-scheme ideas. One afternoon while I was glued to some drag-racing coverage, a funny car called "Showtime" smoked its way through the staging lanes. The lettering along its side looked like the neon signs that you see in any generic '50's-style diner. My mind raced faster than Showtime had gone through the time traps, and I immediately set out to replicate this look on an RC body. The experiment turned out to be well worth the time because the technique I developed became my foundation for painting all illuminated effects.

For the sake of demonstration, I chose Dahm's Virtual Phantasy body—a Pro Mod-style racer with a sinister look. This body is perfect for any pan-type racer, Parma's Hemi kits and most 190 and 200mm tourers.

Top: here's my prepped Dahm's Virtual Phantasy body; the lettering was cut using a Stika machine and then I covered them with a jagged strip of masking tape. Right: adding a bright contrasting color like white to the perimeter area of a decal creates a subtle "glow."

BACKLIT DECALS

Let's start with a basic "backlit" effect; this adds a little dimension to any standard decal. Creating a convincing glow requires close paint control, so no spray cans on this one. If you have yet to invest in an airbrush, check out Iwata's line. I've been using its dual-action Eclipse HP-CS for most of my detail work and its single-action HP-C for general use, and I have had great results (more on these brushes next time).

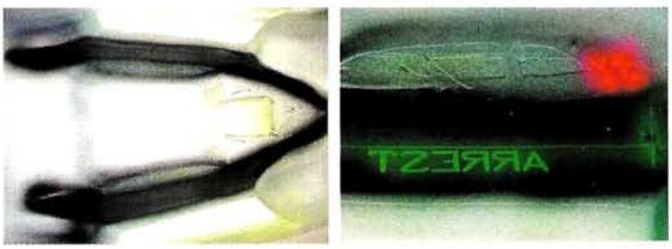
This backlit technique is similar to shadowing, but instead of using a subtle hue, I add a bright color that contrasts with a decal already in place on the body. Holding the airbrush about 4 inches from the body's surface, follow the decal's perimeter spraying at a pressure of about 15psi. It's important to maintain a uniform distance around the decal and to prevent the paint from fanning out more than ¼ inch. If I used a fluorescent color, I would go back over the inner portion of the first coat with a white backing. This is where having a quick-change cap on your airbrush bottles makes life easier. Parma offers these caps for its FasKolor line, and they fit directly into the Iwata siphon-feed brushes. You don't want to completely back-coat the colored areas because a little of the body's final paint color on the body should bleed through the edges of the "halo" to create the backlit illusion that you're looking for.

LED EFFECTS

Re-creating LED displays requires more specialized graphics, but the technique is very similar to the decal trick. I used our Stika machine with a font called "OCR" to create the "Arrest" graphic for the sides of my drag car. This letter style closely resembles the lettering on a hospital EKG display. If you live near a shop that makes vinyl signs, they can cut you some reverse-image lettering for only a couple of bucks. I find it easiest to weed the letters out of the graphic after it has been stuck onto the body. This saves you from having to do a lot of elaborate masking. If you look at calculator, timer, or gauge displays, you'll see they're most commonly found in red, green, or blue. I usually hit the letters with a fluorescent yellow halo first, back them with charcoal to blend into the background color and then paint the letters using a mist of fluorescent green backed with white. You don't want to use the same fluorescent color again, especially if the surrounding color of the body will be white. If you do, the letters will blend together and look like a bunch of colored blobs. Overall, I find that the most authentic-looking designs are against a dark background.

To dress up the car further, I split the side graphic with an EKG flat line that runs along the sides of the car, and I added the car's number using LED-type lettering.

Left: first the fluorescent yellow "halo" is applied to the area surrounding each letter. Right: next I apply charcoal to blend the brightness of the letters into the black background color that follows.



Left: after coating the interior section with black, it's time to remove the masking from the individual letters. Right: I painted the car's number with fluorescent red and then the "Arrest" graphic with fluorescent green.

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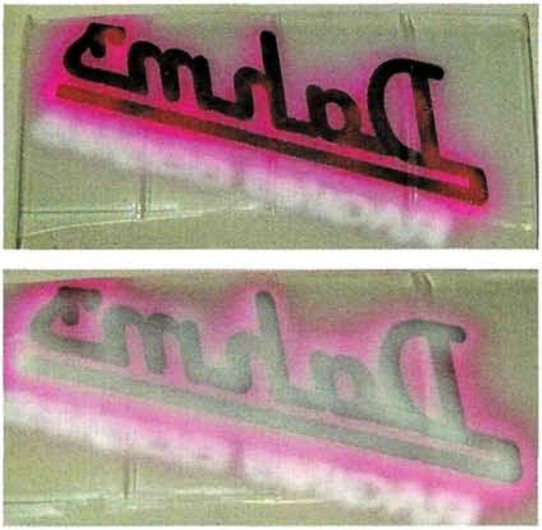
NEON

The main difference between what we've done already and achieving realistic neon effects lies in how the paint is applied. If you look at a typical neon sign, the tubes look almost white, but the light thrown off tints the surrounding area. As a result, the halo area around the airbrushed neon is much more pronounced. I mask the "tubes" of the letters and paint the "halo" first. Once I'm satisfied with the overall look, I remove the masking, add a little water to thin the paint mixture that I loaded in the airbrush and use a light coat to highlight the tube ends and sides. Remember that you only want to add dimension; the remaining area is filled in with white. I reserve neon effects for larger letters, which are easier to paint; smaller letters, or more intricate fonts, tend to become amorphous blobs when painted with the neon technique.

Top left: to give the bold "Cardiac" text some added flair, I shot the upper half of the letters while the green was still loaded in the airbrush. Top middle: the entire section receives a full coat of white to bring out the intensity of the colors.



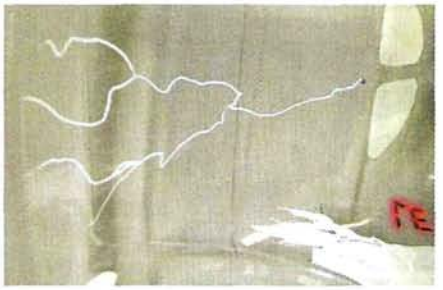
Top: the rear wing receives a halo of fluorescent pink to simulate the glow of the "neon" tubes. The tube portions are next unmasked, and a few pink highlights are added. Middle: the tubes are then fill-coated with white to offer the necessary glow for the neon effect to look realistic. Note that the backing does not fully cover the pink area. Bottom: charcoal paint is applied to offer the look of the opaque spacing tubes commonly found on neon signs. The deck is then finished off with a coat of blue.

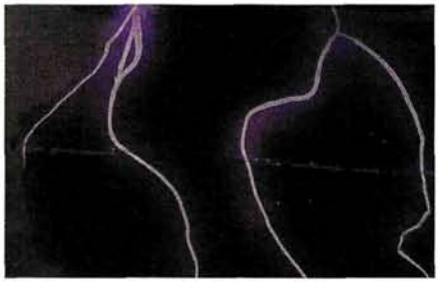
NEW IN THE SHOP

Dupli-Color **Mirage Paint**

The folks at Dupli-Color have released a paint system called Mirage—definitely one of the coolest products I've come across in a while. The stuff is easy to apply, and the finished color completely changes hue according to the angle from which you view it, just like the ChromaLusion paint used on such well-known vehicles as the Bigfoot monster truck and Jeff Gordon's special edition Winston Cup car. Mirage is offered in three color sets that are labeled according to the two colors the paint seems to shift to and from: gold to magenta, silver to green and green to purple. Each Mirage set includes base, pigment and final clearcoat, all in 11-ounce aerosol cans. To use the product on clear bodies, you apply it "in reverse order" to the inside of the shell. Skip the clearcoat (the body itself serves as the clearcoat). The results rival the body-shop specialty colors that cost hundreds of dollars more, and the results have proven durable so far—especially for a non-RC product.

■ Part no.—MP400 (green/purple); MP401 (green/silver); MP402 (gold/magenta); $25.





Top: I use a white china marker to establish the initial "bolt" of lightning; the streaks should be random and erratic to look authentic. Middle left: iridescent fuscia is sprayed as a transitional color that simulates the ionized surrounding sky. Middle right: the bolt is blended into the "sky" of the rear deck using purple and then black. Bottom: the completed rear deck lid shows how narrow random streaks and fast blending colors create the realistic illusion of lightning.

LIGHTNING

Painting realistic-style lightning is easy to do well but even easier to do poorly. I often see lightning effects that are technically well done, but the lightning bolts generally are much too wide and straight to look realistic. Find any book that shows a true lightning bolt and compare it with what you see painted, and you'll see what I mean. If you really want to capture the realism of a thunderstorm, concentrate on the randomness of the bolt. On big projects, I use a white china marker to draw the jagged edge and for small areas, a hollow coffee stirrer dipped in paint. I push the pen and allow it to wander under its own weight to generate a satisfyingly jagged shape. Next, I follow up using any sharp object within reach; I dip it in the paint bottle directly and scatter smaller arcs. Are the lines of uniform width and in proportion? Absolutely not! A real lightning bolt isn't uniform, and your painted version shouldn't be either.

You can simulate the glow of ionized air around the lightning by using a narrow blend of transitional color. On this black section, I used Createx Iridescent Fuchsia. To transition into the night sky, I apply a feather coat of FasKolor purple and then fill the remaining area with black. Don't worry that your work will be washed away; effects like lightning should transition quickly and smoothly into the background color.

It's rare that all of these illuminated effects would be combined on one body, but individually you can use each to really spice up a paint job. I hope that the tips in "Body Shop" will motivate you to try something a little different on your next project. If you have a question, a tip to pass along, or you want to share your success stories, it's always great to hear from you: bobh@airage.com. ■

FRESH PAINT

This gorgeous all-aluminum JPS chassis Clod Buster belongs to Joseph Roberts of Piney Flats, TN. The monster is topped off with a Pro-Line Silverado painted by Kris Norlock of Fusion Grafx. The body was liquid-masked, and then the paint scheme was airbrushed in Pactra lacquer. To contact Kris about his doing some work for you, email fusiongrafx@hotmail.com.

Do you have a sharp, uncluttered photo of your best paintwork? Send it in! Explain the types of paint, products and techniques you used to finish it. Be sure to include your full name and address and your email address if you're online. For information about sending electronic images, check out www.caraction.com. Send print or slide photographs to "Body Shop," *RC Car Action*, 100 East Ridge, Ridgefield, CT 06877, USA.

SOURCE GUIDE

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P.O. Box 360, Cotati, CA 94931-0360; (707) 792-1316; www.dahms-intl.com.

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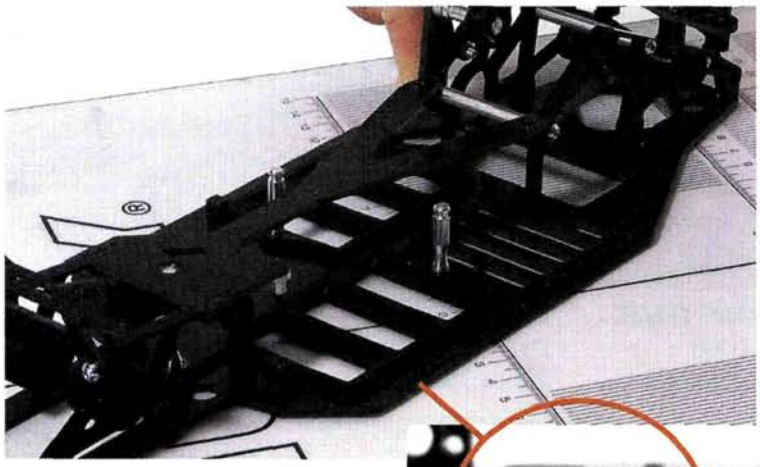
HOW TO

Un-tweak your suspension 4 steps to a better-handling car

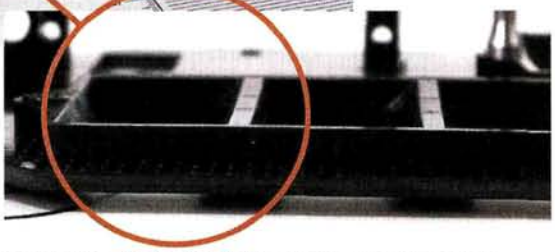
by Derek Buono

The term "tweak" originated with pan-car racers, but it applies to all types of vehicles. While tweak setting is relatively easy to understand and adjust on a pan car, on full-suspension vehicles it can seem like a black art. A chassis is said to be "tweaked" when it is warped, or when the suspension settings create the effect having of a warped chassis.

Tweak causes a car to corner better in one direction than the other, and in extreme cases, it can even cause the car to pull to one side under acceleration. Sometimes, tweak is caused by weight bias; if one side of the chassis is significantly heavier than the other side, the chassis will seem tweaked even if it is perfectly straight and the suspension is set precisely. So how do you know if your full-suspension touring or off-road car is tweaked because of a problem with the chassis, the suspension, or weight bias? And how do you fix it? Follow these steps:

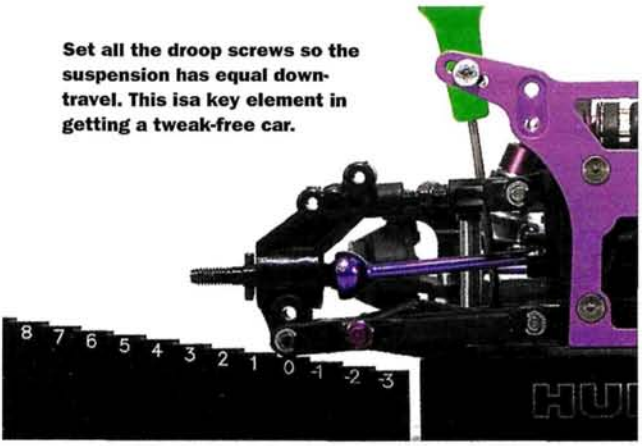


Press down evenly on all four corners of the chassis to check whether it is warped or whether the top deck needs to be readjusted.



Step 1. Check the chassis for trueness

It's best to do this before you build your kit. Remove the front and rear suspension assemblies, and place the chassis on a flat, level surface such as a kitchen counter. Push down evenly on all four corners. If it rocks or one side lifts off the counter, it's warped. If your car has a top deck, loosen the screws; then press the chassis firmly down against the counter and retighten the screws. If that doesn't get the tweak out, it's best to replace the chassis, but you could try to tune other areas to compensate for it.

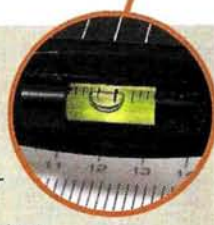


Set all the droop screws so the suspension has equal down-travel. This isa key element in getting a tweak-free car.

Step 2. Set suspension droop

You can skip this step if your car does not use droop screws (also known as down-travel screws). Disconnect the shocks so the arms hang freely; make sure they can swing through their range of motion without binding. If everything operates properly, use the droop screws to set the maximum down-travel so it is the same on both sides of the car. Associated offers an inexpensive molded gauge that makes the job easy; or you can buy a deluxe aluminum version from Hudy. Just make sure your shocks are long enough to allow the arms to reach maximum down-travel. That brings us to the next step.

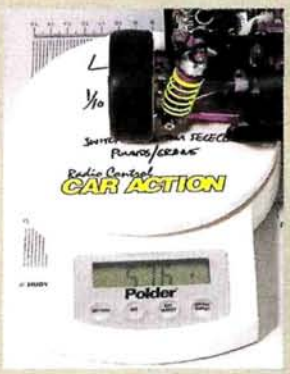
Checking for tweak



Now that all the shocks are the same length and the preload and droop are set, it's time to check the tweak. The best way to gauge suspension tweak is to use a balance system like this one from Niftech (shown on a Hudy setting board).

When using a balance system, set the gauge to level and place the car's front wheels on the stationary bar; be sure to center the car precisely over the pivot post. If the car isn't tweaked, the pivoting bar the rear wheels are on will remain level. If one side drops, that side of the car is heavier, and the car is tweaked. To fix this, recheck the shock length and preload settings; increase the preload on the light side. When you're satisfied with the adjustment, turn the car around and set the front suspension tweak.

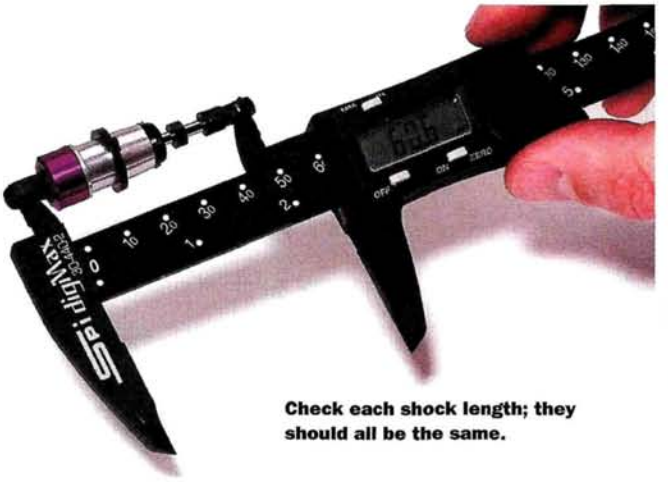
A scale system measures the weight over each wheel and makes it even easier to set tweak. But be warned: it's easy to become obsessed with trying to make the left and right scales read exactly the same, and it's virtually impossible to do. Any change you make to one shock affects the weight distribution to the other three. Get the numbers as close as you can, but remember that races aren't run on scales; they're run on the track.



And that brings us to the most practical tweak test, which is simply a figure-8 lap. Run a figure-8 with the throttle steady and the same steering input from the transmitter when you turn left and right. If your car's turning radius is different for the left-turn parts of the figure-8 than for the right turns, it's tweaked. Likewise, if you know your steering servo's end-points are set properly, but your car spins out when turning in one direction and pushes in the other, it's tweaked. A tweaked suspension may also cause an off-road car to pull to one side or fail to jump straight.

Step 3. Check the shocks' lengths

Shocks are your car's "legs"; if one of your own legs was longer than the other, you would be lopsided. If your shocks are of different lengths, your car will be lopsided. Use calipers or a Trinity Shock Dyno to make sure the left and right shocks are the same length and have the same amount of travel. If they don't, you probably have the wrong number of internal spacers in one of them, or one of the shock shafts may be out of spec. Another possibility: you really goofed up and used a rear shock body on the front suspension, or vice versa. If the shocks are built properly, slight length discrepancies can be eliminated by threading the shock eyelet in or out.



Check each shock length; they should all be the same.

The distance from shock mount to shock mount should be the same on both sides.

Step 4. Set the spring preload

Most touring cars are set with zero sag: the suspension arms are at full down-travel when the car is at rest. Preload is not that critical for this type of setup, since it does not affect ride height. But it is important to make sure that the left and right shocks have the same number of preload spacers and that they're of the same thickness on both sides. Threaded, or clamp-type, preload collars should be set so that the distance from the top of the shock collar to the bottom of the shock cap or top of the shock mount is equal.

Off-road cars are always set with some sag, and preload is more critical here because it determines ride height. It's good to start with equal preload on the left and right shocks as described above; but you may find that slight differences in spring length, the amount of "set" the spring takes, or the chassis weight bias requires that you increase or decrease the preload on one shock to level the chassis.

A digital caliper makes checking preload easy.

Check that the springs are the same length on the left and right sides. If they are not, adjust the preload spacers to compensate for the difference.

Remember, the only reason to check and adjust tweak is to make your car handle as well in left-hand turns as it does in right-hand turns. If your car feels dialed, go with it. A lot of guys seem to spend more time with their cars on tweak boards than on racetracks. Know when to say when! ■

Weighty issues

Most kits are designed to be reasonably balanced with the electronics installed, but a car's components are of various weights, so it will always carry more weight on one side than the other. This can tweak the suspension no matter how carefully you've matched the droop, shock length and preload settings. You'll sometimes have to add lead weight to one area of the chassis to compensate or make preload adjustments to transfer weight from the heavy side. Again, let practicality be your guide; if the car is working well, don't worry if there are a few more grams on one side of the chassis than the other.

If you don't have any lead weight, don't worry. You can use anything, including the change in your pocket, to easily add weight where needed.

SOURCE GUIDE

ASSOCIATED ELECTRICS
3585 Cadillac Ave., Costa Mesa, CA 92626-1403;
(714) 850-9342;
www.rc10.com;
www.teamassociated.com.

HUDY SPECIAL PRODUCTS
distributed by Serpent Inc. USA, West Park Center, 2830 NW 79th Ave., Miami, FL 33122;
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www.hudy.net; info@serpent-usa.com

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(440) 257-6018; www.niftech.com.

TRINITY PRODUCTS INC.
36 Meridian Rd., Edison, NJ 08820;
(732) 635-1600; www.teamtrinity.com.

Convert a Pull-Start to Bump-Start

Reduce weight and improve acceleration

by Bob Hastings

YOU'LL NEED

- After-run oil
- Non-pull-start backplate
- Nitro Wash or denatured alcohol
- High-temp sealant
- Rotary tool with cutoff wheel or a replacement crankshaft for a non-pull-start engine
- Safety glasses

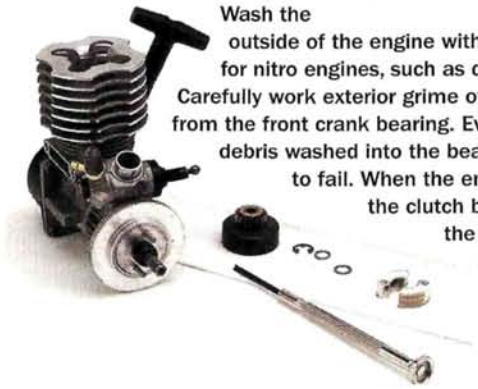
There's no denying the appeal of a pull-start engine; grab your fuel bottle and a glow igniter and go have some fun. Considering the low cost, portability and overall convenience of a pull-start engine, enjoying the hobby couldn't be simpler. However, some vehicles can't accept a pull-start engine because of the extra room required for the starter mechanism. In addition, the weight and increased frictional load of a pull-starter reduces overall engine performance. Converting to bump-start is the solution—one that you'll find is not all that difficult as long as you're comfortable with the basics of nitro-engine teardown. To demonstrate, I'll explain the conversion for the .15 I run in my RC10GT RTR, but the process is virtually the same for any pull-start engine.

WARNING! Before you touch anything, keep in mind that if you cut the crankshaft as described here, you won't be able to go back to your recoil starter unless you replace the pull-start crankshaft. If you aren't sure about your future plans or if you're uncomfortable about taking a rotary tool to your crankshaft, buy a non-pull-start crankshaft now. Some vehicles also require the use of a different flywheel and engine mount, so be sure to consult your vehicle's manual before you start.

Step 1. Clean the engine

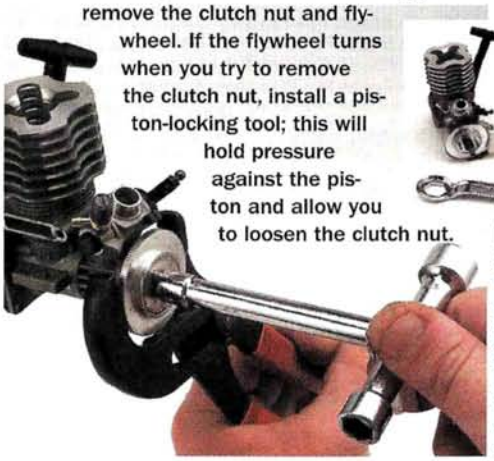
After removing your engine from the chassis, plug the carburetor intake and exhaust port with wadded up pieces of paper towel to prevent debris from entering the engine.

Wash the outside of the engine with a cleaner designed for nitro engines, such as denatured alcohol. Carefully work exterior grime off the case and away from the front crank bearing. Even a little dirt or debris washed into the bearings can cause them to fail. When the engine is clean, remove the clutch bell and shoes from the engine and set them aside.



Step 2. Remove the clutch nut

Use a large pair of channel-lock pliers to grasp the outside of the flywheel. While maintaining pressure with the pliers, remove the clutch nut and flywheel. If the flywheel turns when you try to remove the clutch nut, install a piston-locking tool; this will hold pressure against the piston and allow you to loosen the clutch nut.



If the thought of grabbing your flywheel with pliers makes you shudder, try this strap wrench from Bruckner Hobbies, a dynamite piston-locking tool, or use an OFNA flywheel wrench.

Step 3. Remove the head

Remove the cooling-head retaining screws and carefully take the head off the engine. There are usually head-clearance shims between the head and the piston sleeve. Don't lose them! You will have to reinstall them later.

Step 4. Extract the sleeve

If the piston sleeve isn't indexed to the engine's case with a pin or machined-in marks, draw a line across the sleeve and case with a permanent marker so you'll be able to reassemble the parts properly later. Gently pull the recoil starter; the sleeve should rise out of the engine case with the piston's up-travel (if the sleeve doesn't come up, the piston and sleeve might be worn). Grab the sleeve and pull it straight out of the case.

Step 5. Remove the starter assembly

Remove the pull-starter from the back of the engine. A credit card pushed between the engine case and pull-starter will prevent the recoil spring from unraveling as you remove it. Once it's off, wrap a rubber band or some tape around it to prevent it from uncoiling in your spare-parts box. Next, remove the engine backplate. Be careful to avoid damaging the engine seals when you separate the cover from the engine.

Step 6. Remove the piston

Spin the crankshaft so that the piston is at the top of the engine case, and then slide the connecting rod off the crankpin.

Step 7. Push the crankshaft out

Give the threaded end of the crankshaft a gentle tap to pop it out of its bearings. As you do this, hold the engine with one hand over the backplate opening to catch the crank.

Choosing a starter box

Once the conversion is complete, it's time to choose a starter box that suits your vehicle. Some starters are designed for transversely mounted engines (the crankshaft lies across the chassis); others are for in-line engines (the crankshaft orientation is front to rear). Some starter boxes can be converted for use with either type of engine placement, and others, such as Dynamite's GT/NXT-friendly box, are designed to be particularly well-suited to specific vehicles. Ask your dealer for help.

To operate, starters require a pair of 6-cell stick-type batteries or a single 12V gel-cell battery. Most people install these batteries inside the starter box. Once you've purchased your starter box, take the time to set its alignment pegs to your vehicle. If you do, you'll find your starter box much easier to use.

Step 8. Cut the crankpin

Pad the jaws of a vise with a rag to avoid damaging the threads or the crankshaft, and clamp the crankshaft into the vise. Strap on your safety glasses because now it's time to cut the crankshaft. The best tool for the job is a rotary tool equipped with a cutoff wheel. Be sure to keep the cutoff wheel square to the crankshaft, and work slowly to minimize friction and heat. Remove only the portion of the crankshaft that interfaces with the pull-starter. When you've finished cutting, use a piece of fine sandpaper or a metal file to remove any burrs, and then spray the crankshaft with nitro cleaner to remove any fine metal dust that collected while you cut.

Step 9. Test-fit the backplate

Coat the crankshaft with after-run oil and fit it into the engine case, making sure that it's fully seated in the bearings. Hold the non-pull-start backplate in place, and turn the crankshaft gently to be sure that it doesn't rub the crankpin. If the crankshaft rubs the backplate, remove it and shave a little more material off the crank.

Step 10. Reassemble the engine

When you're satisfied with the clearance between the backplate and the crankshaft, reassemble the engine in the reverse order that you took it apart. In addition to the factory gaskets or O-rings, I suggest that you use high-temperature, oxygen-sensor-safe sealant to prevent air from leaking around the backplate. Don't seal the heat-sink head/piston-sleeve joint, or you could contaminate the combustion chamber, and the sealant would inhibit heat transference to the head.

Step 11. Reinstall the engine

Reinstall the engine in your chassis, using new engine mounts if your kit requires a specific type for a non-pull-start engine. ■

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BRUCKNER HOBBIES	DYNAMITE	OFNA RACING
3587 East Tremont Ave., Bronx, NY 10465; (718) 863-3434; (800) 288-8185.	4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511; www.horizonhobby.com.	22692 Granite Way, Ste. B, Laguna Hills, CA 92653; (949) 586-2910; www.ofna.com.

XTM Racing .15 pull-start

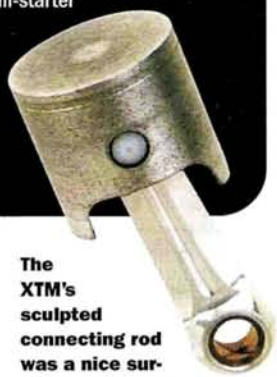
Performance and reliability you can afford

The heat-sink head features a replaceable "button" that the glow plug threads into, so you don't need to replace the entire head if you damage the threads.

specifications

Manufacturer:	XTM
Distributor:	Global Hobby Distributors
Street price:	$85*
Part nos.:	146012 (pull-start w/slide carb), 146010 (bump-start w/slide carb), 146016 (pull-start w/rotary carb), 146014 (bump-start w/rotary carb)
Bore:	15mm
Stroke:	14mm
Available carbs:	2-needle slide with 6.1mm bore, 2-needle rotary with 6mm bore
Sleeve material:	brass/chrome
Intake/boost ports:	3
Crank bearings:	9x17mm (rubber-sealed front bearing)
Cylinder head:	two-piece with separate glow-plug insert
Starter:	available with or without pull-starter
Glow plug:	not included
Peak torque:	20.8 oz.-in.
Max. rpm:	33,000
Rpm @ peak hp:	20,800
Max. power output:	0.45bhp (slide carb, pull-start model)

**Price varies with dealer*



The XTM's sculpted connecting rod was a nice surprise and shows attention to detail unexpected in a "sport" engine.

Are you looking for a new engine—maybe one with a little more power and adjustability? XTM Racing is the newest name in nitro engines, and the company offers a .15 engine that will replace any .12 powerplant. The XTM design is available with or without a pull-starter and with your choice of a slide carburetor or a rotary carb; in short, matching up an XTM .15 to your preferences and needs will not be an issue. Paying the bill won't be an issue either; you can expect to pay less than $90 to get an XTM into your car or truck. I tested a rotary-carb, pull-start XTM .15 in my Kyosho V-One S, and thanks to *RC Nitro* magazine, I have dyno numbers on the pull-start slide-carb version.

FEATURES

• **ABC construction.** That's "A" as in an aluminum piston, which runs in a B-is-for-brass sleeve, which is plated with capital-C chrome. This method of construction offers the most durability and ensures a long-lasting piston/sleeve seal.

• **2-needle carburetor.** Whether you choose slide or rotary, your XTM .15's carb will include a high-end needle and a low-end needle. A 2-needle carb is a basic requirement for proper engine tuning, and it's a real step up from single-needle OEM engines. The high-end needle is slotted to allow it to be adjusted with a screwdriver, so you can tweak it with your car's body on, and the fuel-inlet banjo fitting is metal (and much preferred over cheesy plastic fittings). Bonus: the slide-carb version includes the ball stud and ball cup for the throttle linkage.

• **Machined heat-sink head.** The copper-colored head is an eight-fin design that is short on fancy cutouts but long on cooling area. Given the choice, I'll take the cooling area! Cool-hidden-detail alert: the glow plug (not included) threads into a separate "button" that mates with the head, so if you ever overtighten your glow plug, you can simply replace the button instead of junking the whole head.

• **Rubber-sealed crank bearing.** The rubber seal on the engine's nose bearing helps to prevent fuel residue from leaking out around the crank, and it effectively seals the engine against air leaks; this means a smoother idle and more consistent operation.

• **Machined connecting rod.** The finish work on the connecting rod was a pleasant surprise; all I hoped for was something strong, but the XTM's conrod is downright beautiful. It's knife-edged to slice through the fuel-air mixture as it pumps through the engine, and it just looks cool. Yeah, I know it's invisible when the engine is assembled, but I care about these things.

• **Instruction manual.** I know, that seems like an odd item to list as a feature, but I feel XTM deserves credit for putting together a comprehensive and clear set of instructions that covers everything from tuning, starting and break-in to fuel and glow plug recommendations. Many engine manufacturers skimp on the instructions, but XTM did it right.

IN-CAR TESTING

• **Installation.** The XTM .15 dropped into my V-One S without any fuss, once I had installed the optional engine mounts required for the installation of any non-Kyosho engine.. XTM does not supply a glow plug or manifold mounting

Continued on page 190

When Quality and Dependability Count...
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The popular Du-Bro In-Line Fuel Filters are now available in 3 sporty, anodized colors - Red, Blue, and Purple. Hex design makes opening and cleaning filter a snap. Put one on your airplane, car, boat or helicopter today! For gas or glo-fuel.
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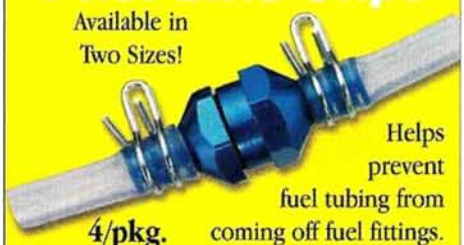
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No. 678 For Lg. Size Fuel Tubing (1/8" I.D.)
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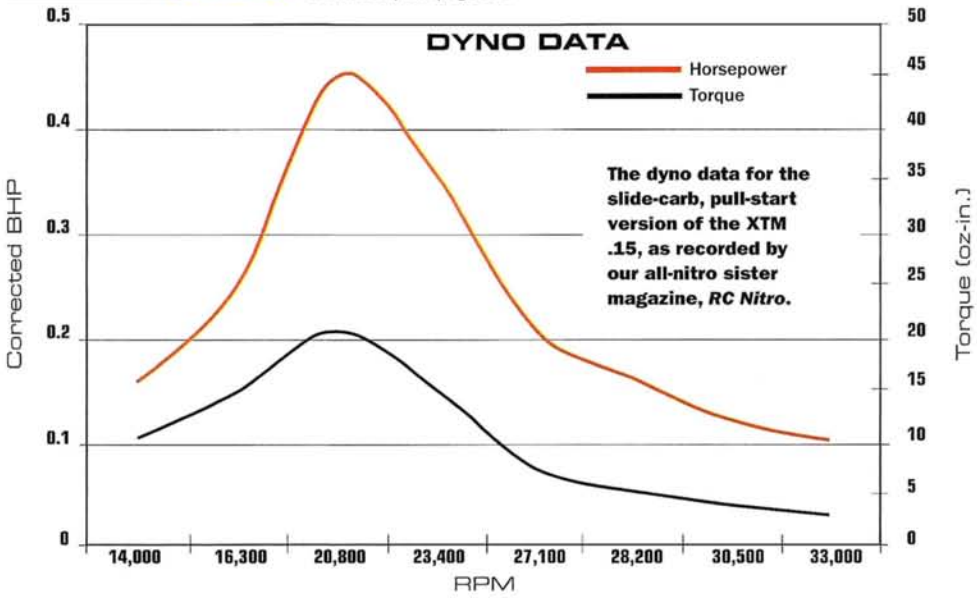
ENGINE TEST

Continued from page 188



hardware, so pick these items up at the hobby store if you don't have parts to swap over from another engine. I installed a McCoy MC-9 glow plug and fueled the V-One S test car's tank with 20 percent nitro, as suggested by the XTM manual.

• **Break-in.** I followed XTM's advice and ran the engine with the high-end needle set 2½ turns out from fully closed, and I drove with short bursts of throttle. After 3 minutes of running, I let the engine cool, leaned the high-end mixture setting by ⅛ turn and went back out for another 3 minutes. XTM suggests that you repeat the process until the engine has accumulated 30 minutes of run time, so that's what I did, even though the engine felt well broken in before the 30-minute mark.

• **Tuning.** With the engine fully broken in and warmed up, I was ready to tweak the low-end needle and the idle-screw settings. Both were close to optimum; I turned the idle speed up ½ turn and leaned the low end by about ¼ turn. Since carburetor tuning is influenced by fuel type and weather conditions, your XTM .15 may require more or less tuning time, but straight from the box, mine wasn't far off.

• **Driving.** The V-One S was quick with its stock Kyosho .15 powerplant, but the XTM .15 felt as if it had more rip off the line. I'm sure the credit belongs with the 2-needle carburetor, which made it easy to set the mixture for a crisp throttle response. There wasn't any lag when jumping on the gas from a standstill, and the engine did not "load up" after idling for 30 seconds. Even after extended idling (more than a minute), the engine did not stall, although it did hesitate slightly until a good blast of throttle cleared it out. Many sport engines would simply sputter and die after sitting that long, and that's normal, so XTM earns a couple of bonus points for reliability.

With the V-One S's stock tuned pipe and manifold, the XTM's throttle response felt linear with just a little ramp-up as the engine neared peak power. As with most 2-stroke engines, the first few thousand rpm weren't the XTM's most powerful, but it does get into its powerband very quickly. I blasted the V-One S around a parking lot for three consecutive tanks of fuel with no complaints from the engine and an average operating temperature of 256 degrees. Hot restarts required no more than five pulls, and cold starting required only one or two tugs. I was satisfied with the XTM's performance when it had been properly tuned, but a good sport engine must also perform when not so well tuned. I gradually dialed out the carburetor to see how far off the settings had to be before the XTM would quit. Like any engine, it will not run if it is set so lean that it can't get enough fuel, but I was impressed by its tolerance of overly rich, "fat" settings. Unsurprisingly, the engine didn't run well when taken so far out of tune, but it did run. If you simply read the manual, you'll have your XTM .15 running its best after a tank or two, but it's good to know the needle settings don't have to be just right for you to enjoy the engine.

THE VERDICT

XTM gives you a lot of engine for your money. If you're moving up from a .12, you'll get larger displacement, and there's no shortage of features: the 2-needle carb, rubber-sealed crank bearing, sturdy pull-starter and ABC construction are the highlights. The engine performs very well when measured against the needs of the sport drivers for whom it is intended; the XTM .15 starts easily, idles well, provides more than adequate power, isn't fussy about needle settings and runs reliably. Its low price is an unexpected bonus; I'd expect to pay more. ■

—Peter Vieira

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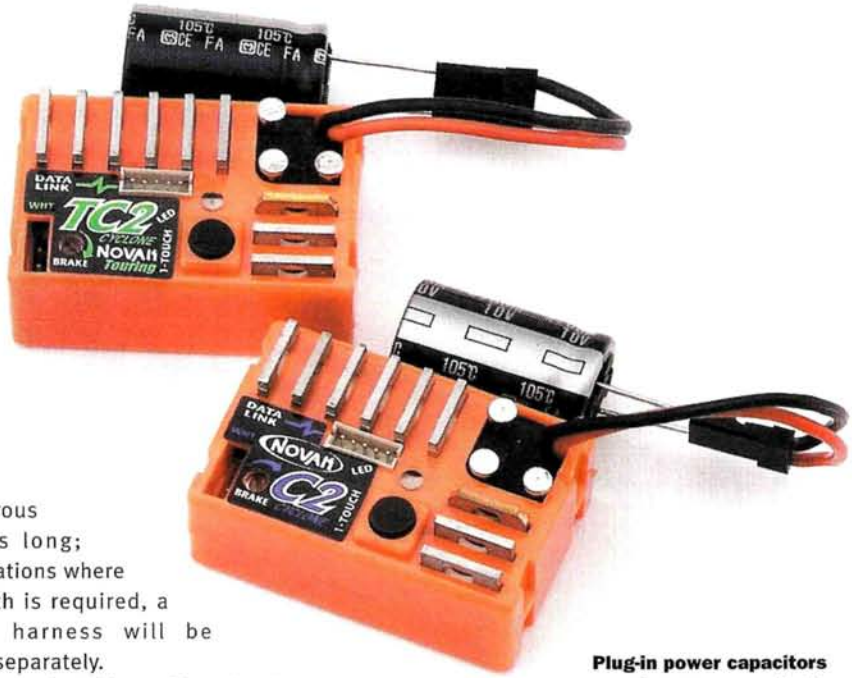
GLOBAL HOBBY DISTRIBUTORS
18480 Bandilier Cir., Fountain Valley, CA 92728; (714) 964-0827.

MCCOY RACING
2117 North Second Ave., Upland CA 91784; (909) 982-3888.

XTM RACING
Distributed by Global Hobby Distributors; http://xtm.globalhobby.com.

Novak
Cyclone C2 and TC2 racing ESCs



Plug-in power capacitors are much more convenient than the solder-on versions of the "old" Cyclones, and the built-in on/off switch makes for a neater installation.

Novak Electronics wasn't the first company to market an electronic speed control, but it has certainly gone on to become the industry's most prolific innovator as well as the most recognizable and ubiquitous ESC brand. These days, Novak is best known for introducing user-programmable software with the Cyclone and the later addition of the Cyclone TC that featured profiles (programs) tailored to touring-car racing. Novak could have left those ESCs alone and done just fine, but the engineers had some ideas and innovations in mind for a new speed control. That brings us to the Cyclone C2 and TC2, which combine the best elements of the original Cyclone with revised software and new convenience features. I spent some quality time with both new ESCs; here's what they can do and how they performed.

FEATURES

• **Combination 1-touch setup button/on/off switch.** You can say goodbye to servo-taped switches and unwieldy harnesses; the new Cyclones are switched on and off with the 1-touch setup button. The convenience benefit is obvious, and you'll never have to worry about a switch coming loose or getting bumped into the "off" position in a crash. When the button isn't being used to switch the ESC on and off, use it to set up the ESC and select the throttle profile.

• **User-replaceable input harness.** Instead of being permanently soldered to the ESCs internals, the Cyclones' input harness (the three wires and connector that connect the ESC to the receiver) simply plugs into the ESC case. This makes it easy to replace a damaged harness, or bundle the harness for a neater chassis. The stock harness is a generous 10 inches long; for installations where less length is required, a 4.5-inch harness will be available separately.

• **Three user-selectable profiles.** This big feature truly set the original Cyclone apart from the pack. The C2 offers Modified, Stock and Drag Brake profiles, while the TC2 has World Cup, High Traction and Touring Stock settings. The settings have been changed from those in the previous Cyclone and Cyclone TC; see the "Profile Specs" chart for all the particulars of each profile.

• **Constant Force braking.** Electric RC vehicles use the electromagnetic field of the motor for braking, and the motor's rpm affect the amount of braking force available; the lower the motor rpm, the less effective the brakes. The Constant Force system senses motor speed and adjusts the brake signal relative to trigger position and motor rpm to provide linear braking at all speeds.

• **Polar Drive Technology.** This feature has been a Novak hallmark since the Tempest Pro. In a nutshell, the circuitry reduces heating at partial throttle and has the side benefit of increased regenerative braking effect when applied to the brake circuitry. Thanks to Polar Drive, the Cyclones do not need clip-on heat sinks under normal racing conditions.

• **Radio Priority Circuitry.** Nothing is more frustrating than dumping seconds before the tone and losing your position—not so much because your car slowed down but because you lost all steering control if you stayed on the gas. In this scenario, Novak's Radio Priority circuitry kicks in to keep your receiver and steering servo fully powered, even when the motor is asking for every last amp your pack can give up.

• **Digital Anti-Glitch Circuitry.** If your throttle isn't glitching, you can assume this feature works! According to Novak, the circuitry recognizes and rejects signals sent from the receiver due to interference.

• **Low-resistance solder posts.** Most racers swap their best ESC out of one vehicle for indoor racing into another for outdoor action, and that often leads to lumpy power wires full of inefficient splices. Since the original

MANUFACTURER'S SPECIFICATIONS

Dimensions	1.69x1.11x0.76 in.
Weight	1.42 oz. (40.26g)
Input voltage	4.8 to 8.4 volts (4 to 7 cells)
Drive frequency range*	122Hz-23.4 kHz
Brake frequency range*	122Hz-23.4 kHz
Minimum brake range	0 to 75 percent full brake
BEC volts/amps	6/3
Rated current**	480 amps forward/160 amps braking
On resistance**	0.00049 ohm
Motor limit	None

*Full range accessible with Novak Pit Wizard. See individual profile specs for preprogrammed frequency settings.
**@25°C junction temperature of transistor.

PROFILE SPECIFICATIONS

	Drive freq. kHz (Profile 1/2/3)*	Brake freq. kHz (Profile 1/2/3)*	Min. drive % (Profile 1/2/3)*	Deadband % (Profile 1/2/3)*
C2	15.6/5.86/7.8	3.9/3.9/5.86	2.0/6.0/4.0	5.0/5.0/5.0
TC2	15.6/11.7/7.8	3.9/5.86/11.7	2.0/3.0/5.0	5.0/3.0/3.0

*C2 Profiles: Modified (1), Stock (2), Drag Brake (3); TC2 Profiles: World Cup (1), High Traction (2), Touring Stock (3).

Continued from page 192

Cyclone, solder posts that allow easy, external wire replacements have been a Cyclone feature. The C2 and TC2 use taller posts that are easier to work with and now offer even lower electrical resistance.

• **Adjustable minimum brake setting.** The brake adjustment pot in the Cyclone case is used to set the minimum amount of push brake. This is the percentage of brakes the user will apply when the throttle trigger reaches the first pulse of brake. The range is zero to 75 percent. If you select the C2's Drag Brake profile, the minimum brake pot will control the percentage of drag brake. (Pit Wizard users: this is only true when the drag brake is configured by making the left-most bit a "1" in the toggle options menu. If the drag brake is configured by making the "Drag Brake Value" greater than zero, the brake pot will only adjust minimum brake.)

• **Built-in Schottky diode.** The C2 and TC2 still call for a motor-mounted Schottky diode, but there's also an internal diode. The double-diode setting, combined with Constant Force braking, is meant to give the Cyclones powerful, easy-to-modulate, fade-resistant brakes. The motor-mounted Schottky diode also reduces arcing across the brushes, so the motor operates faster and more efficiently.

• **Heavy-duty BEC.** If you're racer enough to need a C2 or TC2, you probably also have a power-hungry competition servo. The Cyclones deliver a full 6 volts and 3 amps to make the most of your servo investment.

• **Factory-installed external power capacitor.** Installing the power capacitor on the previous Cyclone was always a hassle, so this feature is highly welcome. The flexible PowerCap harness makes it easy to position the capacitor in a convenient spot—good thing, since the capacitor is huge. Don't get any ideas about swapping out the cap for a smaller one with identical specs; Novak stresses very strongly that such imposters will not perform as well.

TESTING

I ran the Cyclone C2 in my Team Losi Triple-X and parked the TC2 in an Associated Factory Team TC3. The push-button setup procedure went smoothly as usual, and I had no trouble selecting the profiles I wanted. I went with the "Stock" and "Touring Stock" settings first, since both cars had Trinity P2K motors installed. As the chart shows, these profiles use relatively low drive frequencies and relatively high minimum drive settings of 6 and 5 percent (that means the absolute least amount of throttle the motor receives is 6 percent of full throttle for the C2 and 5 percent for the TC2). This delivers a punchy feel, and both cars felt as though they were making plenty of power. I ran both vehicles until they dumped, and the Radio Priority circuitry kept me in control until the cars simply would not go. On the way to dumpville, I ran a few laps at steady half-throttle to try and heat up the ESCs; both stayed very cool and barely got above ambient temperature.

I tried to get a sense of the Constant Force braking system's effectiveness by hauling the cars down from various speeds. I can't say I ever tried similar tests with other ESCs for comparison, but the Cyclones did have very powerful but precisely controllable brakes. Brake control is probably the least practiced and most underrated driving skill in RC but also one of the most important. I look forward to improving my technique with the help of Cyclone power.

That brings me to drag-braking, an option available only on the C2 (unless you have a Pit Wizard). The Drag Brake profile automatically applies the brakes when the trigger returns to neutral (the powerfulness of the drag brake is set with the minimum brake-adjustment pot). Drag brake can be dialed into any ESC by altering the transmitter's neutral throttle position, but the ESC must still pass through the neutral area (deadband) before it reaches the drag-brake setting. For more precise response, the Cyclone replaces neutral with drag brake.

I'll spare you the details of my tests with each profile and with various motors, but I will say that I encountered no surprises; the higher-frequency modified profiles smoothed out my itchy trigger finger when running mods, and the differences between profiles are quite noticeable, especially if you try each profile without altering your car's gearing or motor. And for the record, you can run the TC2 in any electric RC vehicle, on-road or off, and the C2 can be used in touring cars. Likewise, you can use "modified" profiles with stock motors and vice versa; experiment. For those of you without Pit Wizards, Novak is simply trying to offer you ESCs with the profiles that will best suit your needs. In terms of physical construction and features, the C2 and TC2 are identical.

Likes

- Easy-to-adjust minimum brake setting.
- No more separate on/off switch to monkey with.
- Removable input harness–hallelujah!
- Factory-installed power capacitor speeds installation.
- New Cyclone features, old Cyclone price.

Dislikes

- The power capacitor is enormous.
- Performance comes at a price—the Cyclones aren't cheap (but at least the price didn't go up from the previous Cyclone models).

THE VERDICT

I'm very pleased with the new Cyclone C2 and TC2. They are more convenient to install, thanks to the factory-installed power capacitor, removable input harness, integrated on/off switch and new-style solder posts. The various included profiles make meaningful changes to throttle and brake performance, and with the addition of Novak's Pit Wizard, programming flexibility is increased exponentially. On top of all that, the usual Novak reliability and quality are in there, and the confidence that delivers is probably the new Cyclones' best feature. ■

—Peter Vieira

PIT WIZARDRY

The Cyclone C2 and TC2's included profiles make it the most flexible racing ESC available, but if you yearn for the ultimate in adjustability, get yourself a Pit Wizard. With this hand-held device, you can basically mold the Cyclone into any ESC you want. What exactly can you adjust? See the May 1998 issue of *Radio Control Car Action* for an in-depth look at programming with the Pit Wizard, and try these on for size:

- Neutral position
- Full throttle position
- Full brake position
- Deadband value
- Drag brake value
- Drag brake frequency
- Brake PWM frequency
- Drive PWM frequency
- Minimum drive value
- Drag brake toggle

One more thing about the Pit Wizard: if you bought one of the original Wizards, you'll find that your input harness doesn't fit the new Cyclones. Novak's 5710 adapter will get you hooked up; just plug it in. *—Peter Vieira*

SOURCE GUIDE

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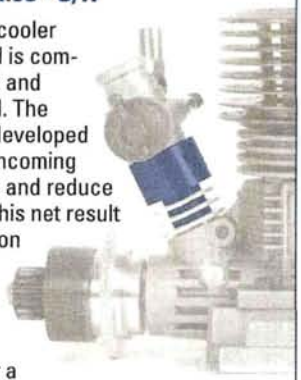

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Chris's BACK LOT

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o *RC Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. My email address is: chrisc@airage.com.

BY CHRIS CHIANELLI

Bay Area Racing Partners update

In my November 2000 "Back Lot," I introduced the Consulting Psychologists Press Inc. (CPP) Racing Team—now known as the Bay Area Racing Partners. The team comprises program director Ken Hawthorn and six Bellehaven Junior High eighth graders. They asked for local support to expand their program, and they received it in all forms, including cash from many sources and individuals.

Going strong, thanks to local support

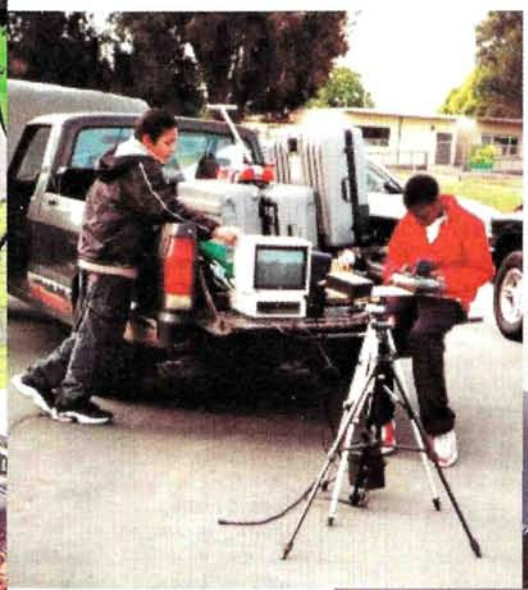
During this year, the Bay Area Racing Partners group has grown to 18 students and, pending the success of their fundraising efforts, Ken's goal is to have 140 students participate and also to start the program in a few children's hospitals. Now, that would be something quite special.

The Bay Area Racing Partners gang. That's Ken Hawthorn at right in the back row with the cap on. At far left is Bill "Angry Scientist" Ambrisco, creator of the virtual reality setup that allowed the guys to drive their Associated TC3 from inside the car using both sight and sound simulation.

Designed to teach students about teamwork and to get professionals out of their cubicles, the program calls for students to build RC racecars, and mentors have already plunged into the high-tech phase of teaching. How does virtual car racing sound?

None of this would have been possible without the involvement of community groups such as the Menlo Park (CA) Police Dept., which contributed its financial support, and individuals such as Menlo Park Police Officer Ron Albertson, who contributed his time and attention to the kids.

You, too, can do some good and make a difference; email Ken Hawthorn at kbh@cpp-db.com or write (to his attention) to CPP, 3803 E. Bayshore Rd., P.O. Box 10096, Palo Alto, CA 94303. ■



Above left: "Angry Scientist" Bill's traveling broadcast truck. This setup, complete with TV monitor so you can see what the driver sees, has the ability to hook up four cars at once with "telepresence" headsets—very cool. The name of Bill's company is Inner Space Racing. Above right: this guy really feels like he's driving from inside the car.

Right: the Bay Area Racing action always draws interest and potential new members. Above: while this little guy was signing up, he could be heard muttering, "I'm gonna kick all their butts."